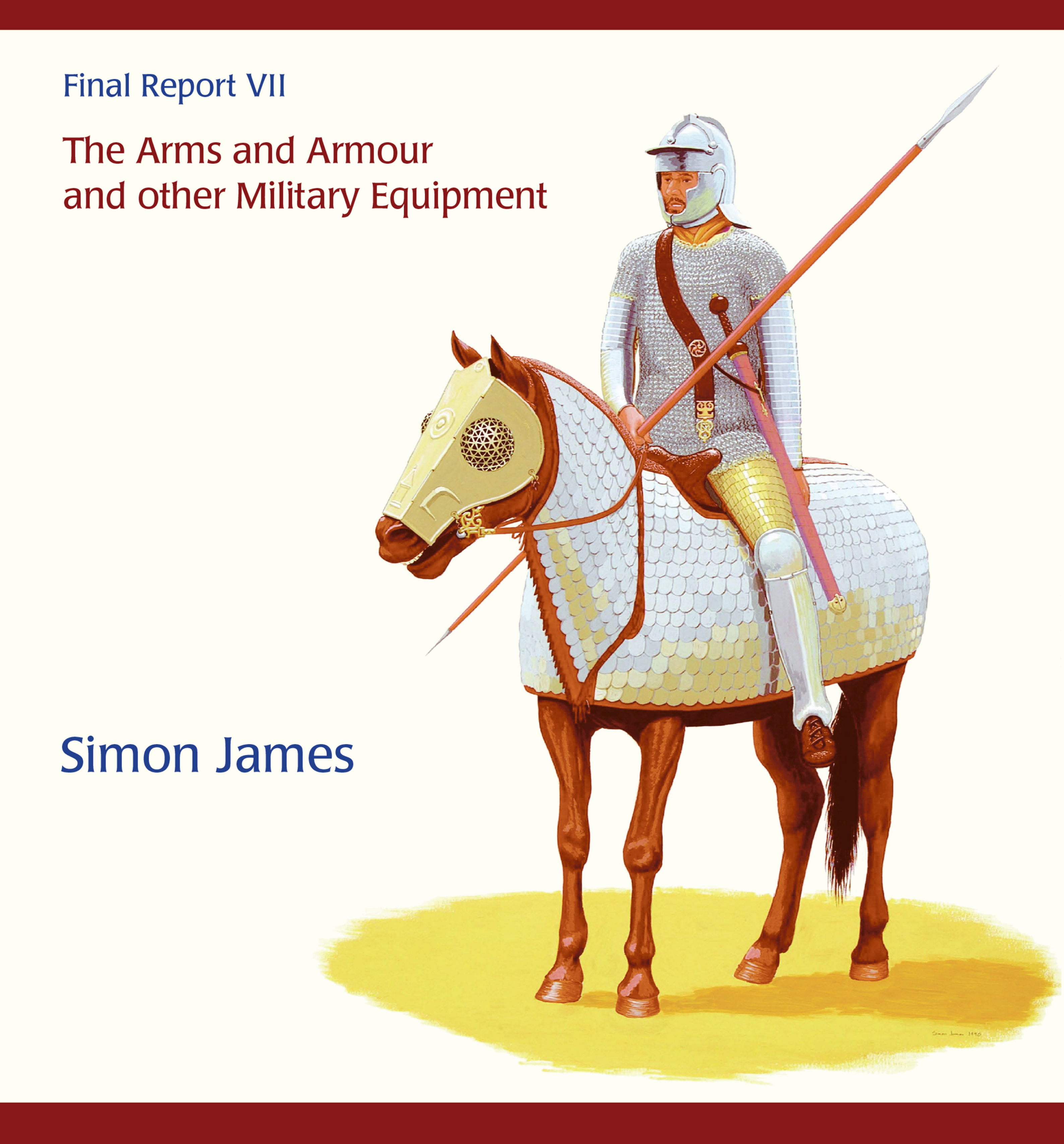
EXCAVATIONS AT DURA-EUROPOS 1928–1937

Final Report VII

The Arms and Armour and other Military Equipment



Simon James

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Oxbow Books
Oxford & Oakville

This book is dedicated to
Peter Connolly

Excavations at Dura-Europos 1928–1937
Final Report VII: The Arms and Armour and other Military Equipment

First published in 2004 by The British Museum Press
A division of The British Museum Company Ltd
38 Russell Square, London WC1B 3QQ

Paperback edition 2010 by Oxbow Books

ISBN 978-1-84217-371-8

Simon James has asserted his right to be identified as Author of this work

A CIP record for this book is available from the British Library

This book is available direct from

Oxbow Books, Oxford, UK
(Phone: 01865-241249; Fax: 01865-794449)

and

The David Brown Book Company
PO Box 511, Oakville, CT 06779, USA
(Phone: 860-945-9329; Fax: 860-945-9468)

or from our website

www.oxbowbooks.com

Printed in Great Britain by
Short Run Press, Exeter

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Summary

Among the remarkable finds of Hellenistic, Parthian and Roman date revealed by the Yale/French Academy excavations at Dura-Europos, Syria (1928–37), were extensive military remains. These included large quantities of arms, armour and other martial equipment, mostly deposited during the Sasanian Persian siege which destroyed the city around AD 255–6. Overwhelmingly, this martial material culture represents the equipment of the Roman garrison trapped in the city, although some belongs to the Sasanian besiegers or to earlier occupants of this Hellenistic foundation. The present work, Volume VII of the *Final Report* series, presents a catalogue and analysis of the material, and attempts to place it in its regional and wider context. It investigates what the weapons and evidence of military dress can tell us about Roman, Partho-Sasanian, Syrian and Mesopotamian soldiers of the period, and warfare and other cultural interactions between them.

The martial assemblage from Dura is of great importance to the military history of the Roman and Sasanian empires, and to that of the indigenous peoples of the Middle East. It is exceptionally large, and unusually well dated. Further, much of it is outstandingly well preserved, including many items composed of organic materials which rarely, if ever, survive elsewhere. It also comes from a site yielding important epigraphic and papyrological data and, equally valuable, visual representations of Roman soldiers and other warriors. All this provides rich contextual information for interpreting the material.

As yet, relatively little is known archaeologically about the arms and equipment of the Parthian or early Sasanian empires, or that of indigenous Syro-Mesopotamian peoples, making the small number of finds from Dura attributable to these societies especially precious. In contrast, while imperial Roman military equipment is already well understood from European sites, Dura provides the only really major assemblage from the eastern provinces. It is therefore of great potential interest for the insight it gives into Rome's relatively little-researched eastern armies.

A number of the finds, most notably several painted wooden shields and two horse armours, have been famous since their discovery because of their unique state of preservation. There are also hundreds of smaller objects, whole or fragmentary, many in much poorer condition, which nevertheless represent almost the entire repertoire of dress and fighting equipment used by the Roman and other ancient armies. These include remains of body- and limb-armour, fragments of swords and daggers, several kinds of shield, arrows and archery tackle, and ammunition from torsion artillery. Several hundred metal items, mostly copper alloy castings, represent fittings from military dress and horse harness, almost all of known Roman types. However, some categories of equipment are represented poorly or not at all. No components of catapults were found, there are few spears or javelins, and only a handful of helmet fragments are known apart from one complete iron example.

This iron helmet is one of the most important of the finds. It almost certainly belonged to one of the attackers, and so is an important piece of early Sasanian archaeology. However, it is of a form which, by the early fourth century, was adopted by the Romans. Adoption of foreign equipment and practices across cultural boundaries is a key theme of the discussion, where it is argued that the evidence from Dura and elsewhere reveals this to have been a multi-directional process. Romans, Iranians, Syrians and Mesopotamians all appropriated elements of each other's martial material culture. In particular, it is argued that Middle Eastern peoples had had a significant role to play in shaping the equipment, and especially the personal dress or 'uniform', worn by Roman soldiers like those besieged at Dura.

The Roman military equipment from Dura is also examined against the background of the wider Roman empire. In a world without industrialized mass production, and in a military governed by custom and tradition rather than modern-style books of regulations, it is remarkable how similar many items found at Dura are to artefacts recovered from as far away as Scotland and Morocco. These patterns are considered in conjunction with evidence from ancient texts and visual representations in the context of recent theoretical advances in understanding of the archaeology of identity. It is suggested that the observed tendency towards uniformity in Roman military equipment is largely explicable in terms of the active use of material culture, especially items of dress and personal accoutrements, in the construction of Roman soldierly group identity. 'The soldiers' as an identity group were central to middle imperial Roman politics, as well as warfare. In the third century AD the Roman military was a regionalized, multi-ethnic entity, mostly composed of locally-recruited men; this is reflected in the overwhelmingly Syrian origins of the soldiers attested at Dura. Within this heterogeneous body, centrifugal tendencies and regional tensions were a serious threat to stability and mutual security. It is argued that the soldiers stationed at Dura and hundreds of other military bases across the empire sought to maintain a sense of common Roman soldierly identity and solidarity, especially through convergent styles of dress and near-uniform visual appearance. Although specifically seen as 'Roman', by the third century AD such dress drew on styles and traits taken from the Danube lands and the Middle East far more than the Mediterranean.

Empire-wide homogenization of equipment in Rome's multi-ethnic armies was so extensive, and the military history of Syria in the AD 250s so complex, that it is uncertain whether Dura's Roman equipment all belonged to Syrian-recruited troops, or perhaps partly came from European expeditionary soldiers serving in the East at the time of the siege. However,

this very ambiguity underlines the fact that the Syrian soldiers of Rome's eastern armies were a fully integrated and important part of the wider Roman military, just as contemporary Syrian aristocrats were fully integrated into the cosmopolitan imperial elite, several of them becoming emperors. The story of the soldiers of Dura, even that of its Roman garrison, is very much a part of Syrian history, and no mere footnote to the chronicle of successive foreign imperial powers which once fought over the land.

Résumé
Parmi les plus remarquables découvertes d'époque hellénistique, parthe et romaine faites par la Mission de l'Université de Yale et de l'Académie des Inscriptions et Belles-Lettres à Doura-Europos (Syrie, 1928–37), se trouvait un abondant matériel militaire. Celui-ci comprenait une grande quantité d'armes, d'armures et d'autres équipements guerriers liés principalement au siège conduit par les Sassanides qui a mis fin à l'existence de la ville en 255–6 de notre ère. Une partie de ce matériel provient des assiégeants sassanides ou même des occupants plus anciens de cette fondation hellénistique mais, pour l'essentiel, celui-ci constitue l'équipement de la garnison romaine de la cité.

Le présent ouvrage, qui est le volume VII des *Final Reports* de la Mission de Yale, présente un catalogue et une analyse de ce matériel qu'il tente de placer dans son cadre régional puis dans un contexte plus large. Il cherche à déterminer ce que les armes et l'habillement militaire peuvent nous apprendre sur les soldats romains, partho-sassanides, syriens et mésopotamiens de la période concernée, sur la guerre et sur d'autres interactions culturelles entre eux.

L'ensemble de ce matériel de guerre est d'une grande importance pour l'histoire militaire de cette époque concernant les empires romain et sassanide et les peuples du Proche Orient. Particulièrement abondant et bien daté, ce matériel est, dans sa majeure partie, étonnamment bien préservé, y compris de nombreux objets en matières organiques qui, ailleurs, ont généralement—si ce n'est toujours—disparu. De plus, le site d'où il provient a fourni un abondant matériel épigraphique et papyrologique et, fait appréciable, des représentations de soldats romains et d'autres guerriers. Tout ceci forme un contexte riche d'informations pour l'interprétation du matériel découvert.

Jusqu'ici nos connaissances sur les armes et l'équipement militaire de l'empire parthe, de l'empire sassanide à ses débuts ou des peuples syro-mésopotamiens étaient très limitées. Cela rend particulièrement précieuse l'attribution à ces sociétés de quelques découvertes faites à Doura. Et si l'équipement militaire romain est déjà bien connu à partir des sites d'Europe, le seul véritable assemblage majeur connu dans les provinces orientales se trouve à Doura. Ce matériel est donc d'un grand intérêt documentaire potentiel sur les armées d'Orient si peu étudiées.

Certaines trouvailles, en particulier plusieurs boucliers de bois peint et deux caparaçons de cheval, sont devenues célèbres depuis leur découverte en raison de leur remarquable état de conservation. Il y a aussi des centaines d'objets plus petits, dont plusieurs nettement moins bien préservés, qui représentent le répertoire complet du vêtement et de l'équipement de combat des armées romaines et d'autres armées de l'antiquité. On y trouve les restes d'une cuirasse, des fragments d'épées et de poignards, plusieurs sortes de boucliers, de flèches et d'arcs et des munitions pour l'artillerie à torsion. Plusieurs centaines d'objets en métal, pour la plupart fondus en alliage cuivreux, représentent des ornements de vêtements militaires ou d'équipements de cheval, pour la plupart d'un type romain connu. Cependant, certaines catégories d'équipement sont peu représentées ou même absentes. Aucune pièce de catapulte n'a été découverte, peu d'épées ou de javelots et l'on ne connaît que quelques fragments de casque en plus d'un exemplaire complet en fer.

Ce casque complet en fer est l'une des pièces les plus importantes. Il appartenait certainement à un attaquant et représente ainsi une pièce importante de l'archéologie sassanide ancienne. Cependant, c'est une forme qui a été adoptée par les Romains au début du quatrième siècle. L'adoption d'équipements et de pratiques étrangères en dépit des frontières culturelles est un thème majeur de discussion où l'on considère, à partir des découvertes de Doura et d'autres sites, qu'il s'est agi d'un processus multi-directionnel. Les Romains, les Iraniens, les Syriens et les Mésopotamiens se sont emprunté les uns aux autres des éléments de culture matérielle militaire. En particulier, on considère que les peuples du Proche Orient ont eu à jouer un rôle significatif dans la constitution de cet équipement, et particulièrement le vêtement personnel d'uniforme porté par les soldats tels que les défenseurs de Doura.

L'équipement militaire romain de Doura est aussi considéré dans le contexte général de l'ensemble de l'empire romain. En un mot, sans production de masse industrialisée et dans un système militaire régi par la coutume et la tradition plus que par des règlements écrits comme aujourd'hui, il est remarquable que de nombreux objets trouvés à Doura soient si semblables à d'autres provenant de sites aussi éloignés que ceux d'Ecosse et du Maroc. Ces objets sont confrontés aux informations tirées de textes d'auteurs anciens et de représentations figurées et examinés dans le contexte des nouvelles théories concernant l'archéologie de l'identité. On a suggéré que la tendance à l'uniformisation que l'on observe dans l'équipement militaire romain peut largement s'expliquer par l'utilisation active de la culture matérielle, particulièrement les pièces de vêtement et d'habillement personnel, dans la construction de l'identité de groupe militaire romaine. 'Les soldats' comme identité collective était une notion centrale pour la politique du moyen empire romain, tout autant que l'art de la guerre. Au milieu du troisième siècle, l'armée romaine était une entité régionalisée et multi-ethnique, composée essentiellement de recrues locales, ce qui apparaît dans le fait qu'on trouve une majorité de soldats d'origine syrienne à Doura. Au sein de ce corps hétérogène, les tendances centrifuges et les tensions régionales étaient une menace sérieuse pour la stabilité et la sécurité mutuelle. On a soutenu que les soldats stationnés à Doura et dans des centaines de bases militaires à travers l'empire cherchaient à maintenir un esprit commun d'identité et de solidarité militaire, en particulier à travers des styles convergents de vêtements et d'aspects extérieurs presque uniformes. Bien que considéré comme spécifiquement 'romain' au troisième siècle de notre ère, un tel vêtement reflétait des styles et des traits provenant des régions danubiennes et du Proche Orient beaucoup plus que du monde méditerranéen.

L'homogénéisation de l'équipement des armées multi-ethniques de Rome à l'échelle de l'empire était si aboutie et l'histoire militaire de la Syrie des années 250 si complexe qu'il n'est pas certain que tout l'équipement de la Doura romaine provienne de troupes recrutées en Syrie. Une partie peut avoir appartenu à des soldats d'un corps expéditionnaire européen servant en Orient à l'époque du siège. Cependant, cette réelle ambiguïté souligne le fait que les soldats syriens des armées romaines d'Orient étaient pleinement intégrés et formaient une part importante de la grande armée romaine, exactement comme les aristocrates contemporains syriens étaient pleinement intégrés dans l'élite cosmopolitaine impériale, ce qui a permis à plusieurs d'entre eux de devenir empereurs. L'histoire des soldats de Doura et même celle de sa garnison romaine fait véritablement partie de l'histoire de la Syrie et ne peut être considérée comme une simple note dans la chronique des puissances impériales successives qui se sont affrontées sur cette terre.

Zusammenfassung
Unter den bemerkenswerten Funden aus der hellenistischen, parthischen und römischen Zeit, die bei den Ausgrabungen durch die Universität Yale und die Französische Akademie in Dura-Europos, Syrien (1928–37) entdeckt wurden, befanden sich besonders viele Militaria. Die meisten Waffen, Rüstungen und sonstigen militärischen Ausrüstungsgegenstände stammen aus der Zeit der sassanidisch-persischen Belagerung, die zur Zerstörung der Stadt um das Jahr 255/56 n. Chr. führte. Die Militärgegenstände können zum größten Teil den belagerten römischen Truppen zugeordnet werden, einzelne gehören zu den sassanidischen Belagerungstruppen oder zu früheren Bewohnern dieser hellenistischen Gründung. Das vorliegend Buch, Band VII der, Final Report' Reihe, enthält sowohl einen Katalog als auch eine Auswertung der Militärgegenstände und versucht, diese in ihren regionalen und größeren Zusammenhang einzuordnen. Die Studie untersucht, was die Waffen und anderen militärischen Ausrüstungsgegenstände aus Dura zu unserer Kenntnis der römischen, partho-sassanidischen, syrischen und mesopotamischen Soldaten dieser Zeit sowie ihrer kriegerischen und auch kulturellen Beziehungen beitragen können.

Das Kriegsmaterial aus Dura ist von großer Bedeutung für die Militärgeschichte des römischen und sassanidischen Reiches und für die Geschichte der ursprünglichen Bevölkerung des Mittleren Ostens in dieser Zeit. Die Sammlung ist außergewöhnlich umfangreich und ungewöhnlich gut datiert. Der Erhaltungszustand der Militärgegenstände ist bemerkenswert gut und die Sammlung enthält viele Gegenstände aus organischem Material, die sonst, wenn überhaupt, nur selten erhalten sind. Die archäologische Erforschung der Stadt hat wichtige epigraphische und papyrologische Quellen sowie bildliche Darstellungen von römischen Soldaten und anderen Kriegern hervorgebracht. Dies alles liefert reichhaltige zusätzliche Informationen zur Interpretation des Materials.

Bis heute ist unsere archäologische Kenntnis der Waffen und Ausrüstungsgegenstände des parthischen oder des frühen sassanidischen Reiches ebenso wie die der ursprünglichen syrisch-mesopotamischen Bevölkerung relativ beschränkt, was jedoch die wenigen Funde aus Dura, die diesen Kulturen zugeordnet werden können, umso wertvoller macht. Während kaiserzeitliche römische Militärgegenstände aus Europa gut erforscht sind, liefert Dura die einzig wirklich größere Materialsammlung aus den östlichen Provinzen. Die Militärgegenstände aus Dura sind deshalb von größter Bedeutung für unsere Kenntnis der bisher relativ wenig erforschten römischen Heere im Osten.

Einige der Funde, ganz besonders mehrere bemalte Holzschilde und zwei Pferdepanzer, sind seit ihrer Entdeckung für ihren ungewöhnlich guten Erhaltungszustand berühmt. Die Sammlung enthält außerdem Hunderte von kleineren, vollständig oder auch nur bruchstückhaft erhaltenen Gegenständen, von denen sich einige in einem weniger guten Zustand befinden; sie repräsentieren aber dennoch das gesamte Repertoire der von den römischen und den anderen antiken Heeren benutzten Rüstungs-, Kleidungs- und Kampfgegenstände. Diese Sammlung beinhaltet verschiedene Rüstungsteile, Bruchstücke von Schwertern und Dolchen, mehrere Sorten von Schilden, Pfeilen und Bögen sowie Munition für Torsionsgeschütze. Mehrere Hundert, hauptsächlich aus einer Kupferlegierung gegossene Metallgegenstände stellen Zubehörteile für bekannte Typen von römischer Militärbekleidung und Pferdegeschirr dar. Andere Kategorien sind jedoch weniger gut oder gar nicht vertreten. Es wurden keine Katapultteile und nur wenige Lanzen und Speere gefunden. Ferner sind nur ein kompletter Eisenhelm und einige Helmfragmente erhalten.

Dieser Eisenhelm ist einer der wichtigsten Funde, weil er höchstwahrscheinlich einem der Angreifer gehörte und deshalb einen wichtigen Beleg früher sassanidischer Archäologie darstellt. Gleichzeitig ist dies aber auch ein Helm-Typ, der im frühen 4. Jahrhundert von den Römern übernommen wurde. Die Übernahme fremder Kriegsausrüstungen und –praktiken über die kulturellen Grenzen hinweg ist ein zentrales Thema der wissenschaftlichen Erörterung und das Material aus Dura und anderen Orten beweist, dass dies ein Prozess in viele Richtungen gewesen ist. Römer, Iraner, Syrier und Mesopotamier eigneten sich Bestandteile der jeweils anderen militärischen materiellen Kultur an. Es liegt auf der Hand, dass die Bevölkerung des Mittleren Ostens bei der Herausbildung der Ausrüstung, insbesondere der Bekleidung oder, Uniform' der römischen Soldaten, eine bedeutsame Rolle spielte.

Die römischen Militärgegenstände aus Dura werden vor dem Hintergrund des übrigen römischen Reiches untersucht. In einer Welt ohne industrielle Massenproduktion und in einem Heer, das von Brauchtum und Tradition und nicht von neuzeitlichen Vorschriften bestimmt war, ist es besonders bemerkenswert, wie ähnlich viele Funde aus Dura Gegenständen aus Schottland oder Marokko sind. Diese Ähnlichkeiten werden im Zusammenhang mit antiken Textquellen und bildlichen Darstellungen analysiert und vor dem Hintergrund von theoretischen Fortschritten auf dem Gebiet der, Archäologie der Identität' diskutiert. Es deutet vieles darauf hin, dass die beobachtete Tendenz hin zur Uniformität in der römischen Militärausstattung mit der aktiven Nutzung materieller Kultur, insbesondere der Kleidung und der persönlichen Ausrüstung, in der Konstruktion römischer soldatischer Gruppenidentität erklärt werden kann.

'Die Soldaten' als eine Identitätsgruppe waren von zentraler Bedeutung für die mittelkaiserzeitliche römische

Politik und Kriegsführung. Im 3. Jahrhundert war die römische Armee eine regionalisierte und multi-ethnische Einheit. Der Großteil der Soldaten wurde aus der unmittelbaren Umgebung der Militärlager rekrutiert; so stammen zum Beispiel die meisten Soldaten in Dura aus Syrien. In einer derart heterogenen Armee stellen zentrifugale Kräfte und regionale Spannungen eine ernste Bedrohung für Stabilität und Sicherheit dar. Der Autor vertritt den Standpunkt, dass die Soldaten, die in Dura und in Hunderten von anderen Militärlagern im römischen Reich stationiert waren, ein Gefühl für gemeinsame römische soldatische Identität und Solidarität anstrebten, insbesondere durch die Übereinstimmung im Stil der Kleidung und ein nahezu gleichförmiges Erscheinungsbild. Obwohl sie als 'römisch' angesehen wurde, enthielt diese Kleidung weit mehr stilistische Merkmale aus den Donauländern und dem Mittleren Osten als aus dem Mittelmeerraum.

Die reichsweite Vereinheitlichung in der Ausrüstung von Roms multi-ethnischen Armeen war so umfassend—und die Militärgeschichte Syriens in den Jahren um 250 n. Chr. ist zudem so kompliziert—dass es bis heute unklar ist, ob die römischen Militärgegenstände in Dura von aus Syrien rekrutierten Soldaten oder von europäischen Expeditionstruppen, die während der Belagerung der Stadt im Osten dienten, stammen. Diese Vieldeutigkeit unterstreicht die Tatsache, dass die syrischen Soldaten in den östlichen Armeen Roms einen voll integrierten und wichtigen Bestandteil des römischen Militärwesens bildeten; ebenso waren zu dieser Zeit syrische Aristokraten, von denen einige sogar Kaiser wurden, vollkommen in die kosmopolitische Elite integriert. Die Geschichte der Soldaten von Dura und die der römischen Garnison ist sehr wohl ein Teil der Geschichte Syriens und nicht mehr nur eine Fußnote in den Chroniken der vielen auswärtigen imperialen Mächte, die einst um dieses Land kämpften.

إن التعقيدات السابقة الذكر توضح لنا درجة الدمج التي كانت جارية بين وحدات جيش الامبراطورية الرومانية. وهو كإنتماء الطبقة الراقية السورية (الارستقراطية) الى طبقات المجتمع الروماني الراقية، الى درجة تولي عدد منهم مناصب الحكم.
وحكاية مقاتلوا الدورا حتى اولئك الذين ضربوا الحصار على المدينة تشكل جزءاً لا يتجزء من تاريخ سورية وليس مجرد هامش في سجل الاحتلالات المتعددة التي تعرضت لها سورية من قبل الطامعين باراضيها.

ترجمتها عن الانجليزية
وجدان مجيد
باحثة آثار

بالرغم من ذلك هناك بعض المعدات الحربية الرومانية المعروفة لم يعثر عليها ضمن الموجودات او انها توجد بشكل قليل. فمثلاً لم يعثر على آلة رمي رومانية مشهورة او حتى على اجزاء منها، وهناك عدد قليل من الرماح والسهام ايضاً، كما ان هناك عدد محدود من الخوذ بإستثناء خوذة حديدية واحدة وجدت على غاية من الجودة.
وتعد الخوذة السابقة الذكر من اهم ما عثر عليه في حفريات الدورة بسبب عودة تاريخها الى بداية الحضارة الساسانية، إلا انها من النوع الذي قلده الرومانيون في بداية القرن الرابع.
وكان تقليد صناعة المعدات الاجنبية من الامور المتعارف عليها بين حضارات تلك الحقبة الزمنية.
وقد اظهرت آثار الدورة ان موضوع التقليد كان جاريا بين الحضارات المتجاورة كالرومانية والايرانية والسورية وحضارة وادي الرافدين فكل تلك الحضارات أثرت وتأثرت بادوات ومعدات الحضارات الاخرى.
ويعتقد بعض الأثاريون ان ابناء الشرق الاوسط كان لهم تأثير كبير في رسم صورة المعدات والملابس (الزي الموحد) الذي كان المقاتلون الرومان يرتدوه وبالذات أولئك الجنود الذين ضربوا الحصار على مدينة الدورة.
وقد قورنت المعدات الحربية الرومانية التي عثر عليها في آثار مدينة الدورة بتلك التي عثر عليها في انحاء اخرى من الامبراطورية الرومانية.
ففي عالم انعدم فيه التصدير وشحت المنتجات الصناعية الهائلة الكميات، وجيش حكمته العادات والتقاليد على العكس من يومنا هذا حيث القوانين الصارمة، تعد نسبة المعدات العسكرية التي وجدت في آثار الدورة والتي تشبه الى حد كبير تلك التي وجدت في اماكن مثل سكوتلاند والمغرب مثيرة للدهشة.
وقد قورنت اوجه التشابه هذه بالمعلومات التي لدينا من الكتابات القديمة والرسومات والنقوشات في سبيل دعم وفهم النظريات الحديثة في دراسة موضوع الانتماء الوهوية الموحدة.
وقد اقترح البعض بعد الملاحظة ان الرومان كانوا يميلون نحو التوحيد في الجيش وادواته خاصة تلك المتعلقة بالزي والمعدات الشخصية، وذلك لدعم روح التوحد والهوية الجماعية.

الجنود كهوية شكلوا اساس السياسة الرومانية داخل روما كما كانوا اساسهافي غزواتها الخارجية، ففي القرن الثالث الميلادي قُسم الجيش الروماني حسب المناطق المتواجد فيها، وضمت تشكيلاته مختلف الحنسيات الإ ان غالبيتها كان من اهالي المناطق التي يحكمونها، وهذا بدا واضحاً من دراسة الهياكل العظمية التي وجدت في منطقة الدورا السورية حيث كانت غالبيتها تعود الى مقاتلين سوريين في الجيش الروماني.
وفي تشكيلات عسكرية كهذه لابد وان كانت التكتلات والاختلافات المحلية مواضيع على غاية من الحساسية وتشكل خطراً حقيقياً على وحدة وامان الجيش.
ويعتقد ان الجنود في منطقة الدورا ومئات من المعسكرات الاخرى كانوا يستمدون القوة من وحدة الانتماء والهوية خاصة تلك الواضحة للعيان كالزي والمظهر الخارجي. وبالرغم من ان موضوع الزي الموحد اصبح مقتصراً على الرومان في القرن الثالث للميلاد إلا الفضل في هذه الظاهرة يعود الى حضارات حوض الدانوب وحضارات الشرق الاوسط وليس لحضارات منطقة البحر المتوسط.

اذا ما اخذنا بنظر الاعتبار الزي الموحد الذي عم الامبراطورية الرومانية (جنودا ومعدات) بكل اصنافها وبشكل مكثف وتاريخ سورية المعقد في العام 250 بعد الميلاد تصبح عملية تحديد ما اذا كانت معدات الدورا العسكرية تابعة الى الوحدات السورية في الجيش الروماني او الى وحدات اوروبية تخدم في منطقة الشرق اثناء عملية الحصار عملية معقدة.

الخلاصة

ضمن الموجودات الرائعة التي يعود تاريخها الى العصور الاغريقية واليونانية والرومانية التي عثر عليها فريق الابحاث الآثارية التابع لأكاديمية (فرنسا / ييل) في منطقة (دورا- اوروبا) في سورية بين (1928 - 1937). عدد كبير من المعدات الحربية، وتتضمنت الموجودات مجموعات كبير من الاسلحة والدروع ومجموعة هائلة من معدات القتال المتنوعة اغلبهااودعت اثناء الحصار الساساني الفارسي الذي انتهى بتدمير المدينة عام (255 - 256) بعد الميلاد.
الغالبية العظمى من الاسلحة تعود للوحدات الرومانية المحاصرة في المدينة. البقية تعود الى القوات الساسانية المّحاصرة او الى محتليين آخريين لهذه المدينة اليونانية المنشأ.
يعكف البحث الحالي وهو الجزء السابع والاخير من سلسلة تقرير نشر نتائج الحفريات الآثارية في منطقة الدورا، على جدولة وتحليل الموجودات ويحاول وضعها في اطارها التاريخي بالنسبة لآثار المنطقة بشكل خاص والعالم بشكل عام.

يبحث التقرير إيضاً انواع الاسلحة والمعدات ومايمكنها إيضاحه عن مقاتلي الرومان والاغريق والساسانيين اضافة الى الجيش السوري وجيش بلاد ما بين النهرين في تلك الحقبة الزمنية. اضافة الى اساليب القتال ونقاط الالتقاء الحضاري بين تلك الامبراطوريات المختلفة.
الموجودات العسكرية في منطقة (الدورا) تعد ذات اهمية بالغة بالنسبة للتاريخ العسكري للامبراطوريتين الرومانية والساسانية اضافة الى تاريخ سكان المنطقة الاصليين في الشرق الاوسط. فهي مجموعة كبيرة عن المعتاد وامكانية وضعها في اطارها التاريخي الصحيح سهلة بطريقة غير معتادة ايضاً، ذلك لكونها وجدت محفوظة (آثارياً) على حالة عالية من الجودة، كما ان العثور على مجموعة من المواد الطبيعية (نباتات، جلود، وعظام) والتي نادراً ما يعثر عليها في الاكتشافات الآثارية ساعد في تحديد تاريخها الصحيح. ووجدت هذه في مكان حفريات يضم نقوش وكتابات على البردي اضافة الى رسومات تمثل المقاتل الروماني وآخريين، كل ذلك يشكل قاعدة قوية لبناء ترجمة صحيحة للموجودات.
وحتى وقت اعداد هذا البحث تعد المعلومات الآثارية التي في حوزتنا عن الاسلحة والمعدات الحربية الاغريقية والامبراطورية الساسانية القديمة قليلة جداً، وحتى تلك المعلومات حول السكان الاصليين للمنطقة السورية - ومنطقة بلاد ما بين النهرين الامر الذي يجعل من المجموعة التي عثر عليها في منطقة الدورا ذات اهمية بالغة.
عند مقارنة ما لدينا من معلومات عسكرية عن الامبراطورية الرومانية نجد ان الاخيرة واضحة ومفهومة الى ابعد المديات بسبب الابحاث الآثارية الاوروبية.
وتشكل موجودات (دورا) المجموعة الرئيسية الوحيدة من الشرق وهي لهذه الاسباب تشكل اهمية بالغة حيث تلقي الضوء على المعدات الحربية الرومانية في المناطق الشرقية التي تشح الابحاث عنها.
وجدت مجموعة من تلك المعدات واهمها الدروع الخشبية المنقوشة و درعي حصان تعد من اشهر ما عثر عليه في المنطقة بسبب درجة جودتها عند اكتشافها. وهناك ايضاً المئات من الموجودات الصغيرة، بشكل كامل او مهشم، كما عثر على العديد من الموجودات في حالة سيئة، إلا إن المجموعة بأكملها تشكل الدليل الشامل لملابس ومعدات الحرب المستخدمة من قبل جيش الحضارة الرومانية وجيوش الحضارات المجاورة.
وهذه تتضمن اجزاء من دروع الاجساد ودروع الاعضاء (يد أو قدم أو رأس)، إجزاء من سيف وحربة ودرع، رماح و سهام واجزاء من اقواس للرمي، وذخائر اللوي العسكرية، ومئات من المعدات الحديدية، على وجه الخصوص قوالب لسبائك النحاس على شكل اجزاء من ملابس حربية او لجام حصان وبشكل عام كل ما نعرفه عن المعدات الحربية الرومانية.

Acknowledgements

Firstly and most importantly, I would like to thank Susan Matheson, Curator of Ancient Art at Yale University Art Gallery, New Haven, USA, for making this publication possible, by generously giving access to the artefacts and archives constituting the Gallery's Dura-Europos Collection over an unconscionably long period. Her research assistants over that time, from Katina Lillios to Genevieve Gessert, Megan Doyon and others, provided invaluable assistance, both in the Gallery and via internet and mail. The staff of the John W. Higgins Armory Museum also kindly provided access to the parts of the collection then in their care. I am also extremely grateful to curators at the other museums where Dura material is housed, especially Dr Sultan Muhesen and the National Museum, Damascus; John Hayes and Alison Easson of the Royal Ontario Museum, Toronto; and M-J. Castor of the Louvre, Paris.

My original PhD research on the arms and armour was financed by British Academy grants, which enabled me to pursue studies in Syria and the USA. I also owe particular debts to my PhD supervisor, Mark Hassall, for his unstinting and enthusiastic support, and to Martin Millett and the late Tim Potter for their careful additional scrutiny of my thesis, and unflagging encouragement. During the post-doctoral phase Mike Bishop, Lindsay Allason-Jones and Jürgen Oldenstein kindly scrutinized the catalogue and my arguments, and provided much helpful comment and information.

The major subsequent expansion of the project to include the hundreds of other military fittings was made possible by the kind granting of a Special Research Fellowship funded jointly by the Leverhulme Trust and Durham University. I am especially grateful to Colin Haselgrove for facilitating and supporting my post-doctoral fellowship application, and to John Reeve and The British Museum for allowing me leave of absence to take up the fellowship from which, in the event, I never returned to Bloomsbury.

In recent years, an invaluable additional source of information, ideas and understanding of Dura and its archaeology has been the friendship and support of Pierre Leriche and his colleagues of the CNRS. Their kindness in giving me a role in the current Dura research project, and access to the new finds of military material from the site, while they do not form a direct part of the present volume, have nonetheless greatly assisted and enhanced it.

There are innumerable other individuals who assisted or contributed in various ways, to whom I would like to express my gratitude. In no particular order these include: Katina Lillios for permission to use her unpublished metal analyses of scabbard fittings; Mrs Wright, widow of the late Donald Wright for permission to have a copy of his unpublished work on the Dura arms; the late Merrill Lindsay, for his hospitality during my early visits to Yale, and discussion of our shared interest in the Dura arms; Dietwulf Baatz and Michael Lewis for discussion of catapults; Catherine Johns and Valerie Rigby for comment on the belt fittings; Edward McEwan for his expertise on archery; Margaret Snape for discussions on brooches; Richard Reece for advice on coins, and general encouragement; and Carol van Driel-Murray for help in understanding Roman leatherwork, especially footwear, and providing assistance with illustrations. Anny Allara (sadly deceased), Julian Bowsher, Dragan Bozic, Jon Coulston, Phil Freeman, Pam Graves, Francis Grew, Jana Horvat, Ralph Jackson, David Kennedy, David Nicolle, John Paddock, René Rodgers, Margaret Roxan, St. John Simpson, Guy Stiebel, David Thomas, John Peter Wild and John Wilkes also all provided information, advice, support or assistance in various ways; my thanks to them. Pierre Leriche, Hella Eckardt and Wajdan Majeed kindly provided translations of the summary, and Helen Foxhall Forbes undertook the indexing. On a practical note, thanks to Brian Alvey and Jonathan Moffat for help with the early stages of computerizing my thesis; my mother for initial typing work, and Patricia Price for support and proof-reading of the thesis; my sister Judith and a friendly Arab horse for modelling for the equestrian reconstructions; and my wife Jill Harrington for helping me make the time to get it all finished. By no means the least of my debts are to my editor at BMP, Teresa Francis, and copy editors Lindsey Taylor-Gutharz and Sean Kingston, for their help and patience. I am also extremely grateful to the Trustees of the Dr M. Aylwin Cotton Foundation for their grant towards the costs of publication.

After a lapse of so much time I am bound to have omitted names, and therefore offer my apologies to anyone accidentally forgotten.

Finally, I have one much wider general debt to acknowledge: to Peter Connolly, an outstanding illustrator and self-taught experimental archaeologist who, in his time, has taught the academics more than a thing or two. Over the last twenty years and more Peter has inspired my own work in many ways, not least in placing central importance on visual representation. It is with great pleasure that I dedicate this volume to him.

Figure 1 Aerial photograph of Dura from the south, taken during the 1930s.

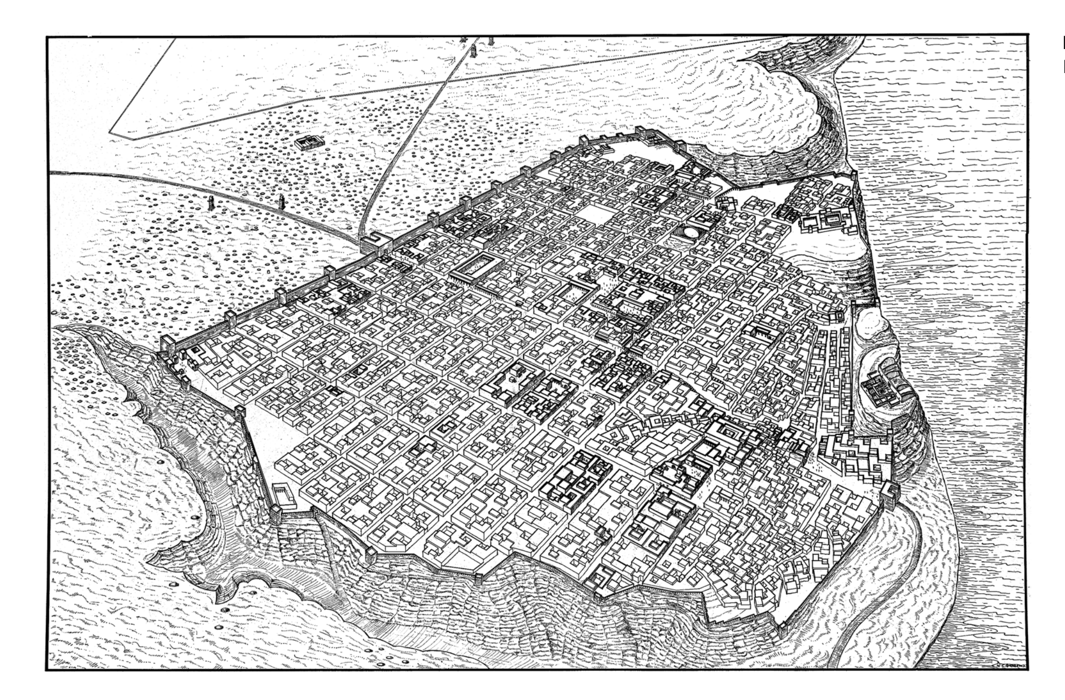


Figure 2 Reconstruction of Dura-Europos in Roman times.

Preface

> No excuse is needed for returning again to the extraordinary series of discoveries made at Dura-Europos in the 1920's and 1930's. Whatever reservations we may have as regards the presuppositions of those who undertook these investigations, about their methods and procedures, and about the still incomplete publication of their results, the work done there still represents one of the most wonderful and creative chapters in the whole history of archaeology. (Millar 1998, 473)

Dura-Europos was a city on the Middle Euphrates, founded by the Macedonians, largely populated by Mesopotamians, long ruled by the Parthians, and annexed by the Romans (Fig. 1). It spent its last decades as one of many cities in the Roman East hosting an imperial garrison. Not the least remarkable of the remains to survive from the ancient town are the artefacts representing these soldiers and their activities – particularly the desperate but unavailing defence of the city against the Sasanian Persians who, in the middle of the third century AD, took the city and depopulated it, leaving it virtually abandoned to the winds for more than sixteen centuries.

It is now over eighty years since the site was reidentified as the Dura or Europos of Antiquity. The site was rediscovered in the aftermath of the final clash between European and Asiatic empires, the last in the long series from Alexander to Allenby, which culminated in the fall of Ottoman Turkey. Throughout its half-millennium history, from around 300 BC to the mid-third century AD, Dura-Europos was always subject to foreign imperial powers, and was sometimes garrisoned by their auxiliaries. It was founded by one empire – the Macedonian Seleucid state – and became a western stronghold of another – the Parthian kingdom – although it was garrisoned by archers from the oasis city of Palmyra. Then, as an eastern frontier base and fortress of Rome, it continued to be manned largely by Palmyrene auxiliaries (now formally incorporated as a Roman regiment), and legionaries of Syrian birth. It was destroyed by a Sasanian Persian army, again probably consisting mostly of contingents from subject and allied peoples. It is therefore perhaps historically appropriate that when the site was revealed to the modern world during the collapse of a later empire – Ottoman Turkey – the instruments of that discovery should be colonial troops of yet another imperial power, this time Britain.

The remarkable painting of the Roman tribune Julius Terentius sacrificing to the Palmyrene gods (Plate 1; Fig. 18), the first glimpse of Dura's ancient garrisons, was revealed by men of a British-commanded Indian battalion. On operations to suppress local Arab resistance to the establishment of European colonial rule in succession to the Ottomans, the battalion was camping in the then anonymous ruins. It was on 30 March 1920, while digging defensive positions along the earth-shrouded city walls, that men of the battalion revealed wall-paintings. Encouraged by visiting American archaeologist James Henry Breasted to extend their digging in search of others, they brought the Terentius scene to light (Breasted 1924, 50–7). This painting revealed the name of the city and also depicted men of its garrison, as we now know the auxiliaries of *cohors XX Palmyrenorum* (Plate 1). Thus it was that Asian auxiliaries of the British empire came face to face, so to speak, with Asian auxiliaries of the Roman empire. To round off these imperial symmetries with some echoes of a specifically Roman past, the first substantial excavation of 1922 was largely undertaken by men of the French Foreign Legion (Cumont 1926, 90), while the first Yale/French Academy season of excavation in 1928 was conducted in part by soldiers of the French-raised Syrian Legion (*Rep*. I, 2).

The involvement of the Syrian Legion in the uncovering of Dura illustrates a fundamental point: while on the surface this is a story of imperial ideologies and the clashes of great but distant powers on the plains of Mesopotamia, the actors themselves were frequently people of much more local birth. Throughout, whether they thought of themselves as Greeks, subjects of Parthia, Romans or simply Durenes, this is mostly a story of Syrians and Mesopotamians, of peoples of whom some at least were already called Arabs (Gawlikowski 1997, 41). This is very much part of Arab history, too.

Between the World Wars, Dura was extensively excavated, but the rich material record of the military life (and death) of the city which was revealed has languished, largely unpublished, for a lifetime; the projected *Final Report VII* on the arms and armour was not even started by the excavators. I have been fortunate to have the opportunity, finally, to fill the gap.

The present volume began as my doctoral thesis (James 1991), which was initially intended to be a general study of the arms and equipment of the later Roman army. However, various factors conspired to limit its scope to material from one city, deposited, for the most part, in a single year. The main reason for this refinement was my visit to Yale University Art Gallery in 1981, which revealed the potential of the unpublished arms and armour recovered during the Yale/French Academy excavations at Dura; most of the material is housed there. It became clear that study of this remarkable assemblage would require a thesis in its own right. This project was made possible especially by the warm welcome I found at Yale, and the unstinting support I have since received from Susan Matheson, Curator of Ancient Art at Yale University Art Gallery, who permitted and encouraged me towards writing *Final Report VII*. It could never have been completed without the generous help and support of many other scholars in the USA, Syria, Canada, France and the UK. The following is an analysis of the material available to me in the United States, Canada and Syria, supported by work on other published evidence.

The present work is more broadly drawn than either my original thesis, or Yale's original publication plan. It includes a consideration of *all* the identifiable military artefacts, including

those pertaining to dress which, it became apparent, were of vital importance to understanding the soldiers of Dura. This has involved a virtual doubling in size of the catalogue and discussion, and required reconsideration of some material already published by others.

This volume has taken far longer to complete than I ever anticipated, and some words of explanation, if not justification, are called for. Had I known that it would take over twenty years of intermittent effort to bring this project to fruition, I would never have dared to start it. When I began, circumstances were very different from those now prevailing. Today it is commonplace in the UK for PhD theses to be finished within four years; then it was seen as equally important while undertaking the research to gain experience of teaching, to publish, and if possible to find a permanent job, which usually resulted in long delays in thesis completion, or failure to do so. Of my peer-group of about half a dozen postgraduates, to my knowledge only two of us ever finished – the kind of outcome which subsequently led the State to tighten up the rules – although all of us are now using our expertise in professional archaeology, the heritage sector or higher education. In my own case, the original thesis was long delayed by a combination of various unanticipated personal and domestic difficulties which required me to divert my efforts into writing for money, while the exigencies of my full-time job in the British Museum Education Service allowed no formal time for research. The latter meant the thesis, and various other research I was engaged in at the time, largely had to be completed during evenings, weekends and leave, and in such time as could be begged, borrowed and stolen with the informal sympathetic support of my superiors there. Subsequently, the post-doctoral phase of the Dura research was only made possible by the generous support of Durham University and the Leverhulme Trust.

Nevertheless, there have been some unanticipated consolations arising from the delay. Not least, it has allowed me to take some advantage of the general advances in archaeological theory in recent years. There has also been a wave of scholarly activity and innovatory thinking about ancient armies – or, more especially, soldiers – and about warfare and frontiers, particularly pertaining to the Roman world which, if it is not yet a revolution, promises to become one. Recent years have seen the appearance of ground-breaking works on both Roman military affairs in general (e.g. Goldsworthy 1996, Whittaker 1994) and on the East in particular (e.g. Isaac 1992, Kennedy 1996a). I have been extensively influenced by these developments, and have sought to make my own contributions to them (James 1999, 2001a, 2001b, 2002). In preparing this volume, I have been fortunate to have access to a number of other publications of collections, both military ones like Boube-Piccot's province-wide catalogue of Moroccan bronzes (1994) and site assemblages like that from South Shields (Allason-Jones and Miket 1984), and also wider, mainly civil collections such as *Colchester II* (Crummy 1983), from which many examples could be taken and lessons learned. I hope the result approaches best current practice, within the limitations of the data available. Last but by no means least, I have been able to draw on the work of Mike Bishop and Jon Coulston, whose *Roman Military Equipment* (1993) provides the fundamental point of reference for any such work as this.

It must be admitted at the outset that the label 'Final Report' is misleading, since it really represents the mapping-out of an assemblage on which a great deal of important work remains to be done. Dura is a key potential laboratory for what archaeology, in combination with studies of visual representations, epigraphy and papyrology, can tell us about the martial aspect of Antiquity. The present volume is a first step in this process for, given the scale of the task, the relatively modest resources available and the confines of a manageable publication, it can only be a provisional interpretation. However, I have felt that it was essential that this should go much further than simply presenting a catalogue and discussion of the artefacts. I have attempted to follow through to an initial assessment of the wider implications of the assemblage, for Dura, the world of Rome and its neighbours in general. Although I am a Roman archaeologist, and the Dura military equipment is mostly about Rome, I believe that in peace or war Rome, civil or military, cannot usefully be studied in isolation, but can only be understood in the context of two-way interaction with other peoples, something I have argued for Roman Britain (James 2001b) and argue here for Roman Syria, and Dura in particular.

The result at least contributes to the filling of the remaining gaps in the publication of the Dura excavations deplored by Millar above. I hope that it also lays the foundations for further projects on the artefacts themselves, especially exploring their context in greater depth, to see what they can tell us about the life (and sudden death) of soldiers in Roman Dura and contemporary Mesopotamia. Work on such aspects is underway, and will appear elsewhere (e.g. James 1999).

Simon James
School of Archaeology & Ancient History,
University of Leicester,
Leicester,
LE1 7RH,
UK



Plate 1 The Terentius painting, after the colour interpretation published by Cumont (1926, pl. L).

Plate 2 Detail of Cumont's rendering of the Terentius painting, showing the tribune Julius Terentius (left) and other soldiers of cohors *XX Palmyrenorum*, including the blond-haired junior officer (?) with swastika-decorated tunic (right).



Plate 3 The portrait of Heliodorus the *actuarius*, from the House of the Scribes.



Plate 4 Synagogue mural, battle of Eben-Ezer (copy painted by H. Gute).



Plate 5 Synagogue mural, Mordechai and Esther, panel WC2, 1 (copy painted by H. Gute).

Plate 6 Shield I (**616**), the 'Homeric shield' (copy painted by H. Gute).



Plate 7 Shield II (**617**), the 'Amazon shield' (copy painted by H. Gute).

Plate 8 Shield II (**617**), back, showing reconstruction of the hitherto unpublished painted motif, with iron reinforcing/grip bar restored, and suspension loop *in situ* (copyright: author).



Plate 10 Semicylindrical plywood shield **629**, as now preserved at Yale.

Plate 9 Shield III (**618**), the 'Shield of the Warrior God' (copy painted by H. Gute).



Plate 11 A reconstruction of three Roman soldiers of the Dura garrison in 'camp dress', first half of the third century AD. Based primarily on representations and archaeological finds from Dura itself, they comprise a lesser officer (perhaps a centurion: left), a military clerk (centre), and a tribune (right). See p. 258 for discussion. Copyright: author.



Plate 12 A reconstruction of a Roman cavalryman, of the first half of the third century AD, based on archaeological finds from Dura and elsewhere in the empire, and contemporaneous visual representations. See pp. 258–9 for discussion. Copyright: author.



Plate 13 A reconstruction of a Roman cataphract (fully-armoured cavalryman) of the first half of the third century AD, based primarily on representations and archaeological finds from Dura. See p. 259 for discussion. Copyright: author.

Part 1

Discovery and context

Discovery and context

The assemblage and its potential

The excavations of Dura-Europos have provided an invaluable window on life in the Middle East from the third century BC to the third century AD, in Seleucid, Parthian, Roman and early Sasanian times. Among the most important of the surviving remains are portable artefacts belonging to the soldiers, especially the Roman soldiers, who lived, fought and, in some cases, died at Dura.

The value of studying military artefact assemblages

Many of the military finds from Dura would catch the attention of any viewer as spectacular artefacts in their own right. However, some scholars of the ancient world, not least historians, have been dismissive of the study of military equipment as of no significant potential for contributing to wider, supposedly more important issues in the study of the past. This situation still obtains, despite the development since 1960 of the small field of Roman military equipment studies, which owes its present flourishing state to the pioneering work of H. Russell Robinson (1975). This is partly the result of scholarly misunderstanding of the nature of archaeological evidence, which in turn is due to the relative youth and the theoretical underdevelopment of research into such material.

For example, the historian Adrian Goldsworthy rightly highlights the shortcomings of past archaeological work on arms, which has concentrated solely on the function of weapons to the exclusion of the key question of morale. In consequence, he is rather dismissive of the potential of archaeology, as opposed to documentary studies, for understanding Roman warfare (Goldsworthy 1996, 10, 173–4). Even David Kennedy, an archaeologist, is hardly more enthusiastic; in his survey of the evidence for the Roman army in the East, he does not mention military equipment or other artefacts at all. Clothing, fittings, horse harness, arms and armour are not listed as even potentially significant. The record consists of installations and texts (Kennedy 1996b).

There are a number of other reasons for the relegation of such studies to the periphery. Most military history has been written from the point of view of officers and commanders, and 'grand' themes such as military organization and structures, officers' careers, strategy and tactics. This has been generally true of studies of the Roman army in Britain and elsewhere, and especially those of the Anglo-German tradition exemplified by the influential 'Durham school' founded by Prof. Eric Birley (e.g. Birley 1988a). Hardware such as weapons and the remains of military dress represent as directly as possible the soldiers in the ranks, an area with low status in Birley's scheme of things (Birley 1988b, 3; James 2002).

Another discernible factor is academic prejudice against the practical – how people did things, made artefacts and used them. Such aspects are often implicitly devalued as 'uncerebral' and therefore trivial. Military equipment studies in particular have long involved the use of experiment through the construction of replicas in order to understand practical aspects of the use of weapons and armour. These are regarded by many scholars with a mixture of amusement, embarrassment or scorn, especially when produced and used, mostly for public display, by the historical re-enactment groups that are so numerous in Britain, such as the 'Roman legionaries' of the Ermine Street Guard, whose experiences actually provide enormously valuable feedback for understanding the artefacts in question. These activities also stir other deeply rooted suspicions. Since the First World War, Western culture has generally come to regard the study of war and violence as morally suspect and lacking in intellectual credibility. Such military history as is undertaken has long tended to avoid the realities of battle, interest in which is likely to be seen as psychologically dubious (Keegan 1988, 28–31, 48–59; Luttwak 1993, 5; James 2002).

More cogently, as was mentioned above, many of those who work with military artefacts have been open to charges of failure to move beyond crude and anachronistic functionalism in explaining and interpreting the material. Although this has started to change, much discussion of, for example, the design of dress and weapons still revolves solely around supposed enhancements of protective features in helmets and so on, as though the Roman army conducted modern-style experimental trials, and 'must have' improved armour during the early imperial period at least (assumptions underpinned by an expectation of progress under the 'high' empire, and of deterioration during Rome's 'decline'). The possibility that many changes occurred for other reasons, and that features may have been adopted for their symbolic meanings rather than any functional purpose, is only now beginning to be considered.

As long ago as 1970 Donald Dudley wrote that 'in the last resort, the design of helmets counts for less than the morale of the men who wear them' (Dudley 1970). I believe that new intellectual tools now available in archaeology for the study of such material can help us to address this valid criticism. Dura provides a striking instance of the potential of archaeology as a primary means of exploring the past, not as a mere 'handmaiden of text based history'. It can act as a laboratory to demonstrate that archaeology, deployed on equal terms with textual sources, can make equally profound contributions to writing history in the most general sense. It will be argued that the study of Dura's martial material culture

in particular can go far beyond the merely functional, to deepening our understanding of military history, and not least of the social history of soldiers and the communities among which they lived.

The creation of a detailed narrative of the siege, and our understanding of the competing forces and their actions, methods and equipment, do not simply form an archaeologically-led project; they reveal a story almost *entirely* told by archaeology. Dura is about weapons and equipment in the context of a battlefield, in the absence of directly relevant texts. It challenges assumptions about the inherent potential of archaeology made by writers like Goldsworthy: for example, the material remains of the twisted bodies of the men who died in the countermine at Tower 19 bring us as close to the real experience of soldiers on the battlefield as any Latin text.

At a superficial level, Dudley was right to say that equipment design was less important than the morale of the wearer but, at a more subtle level, he was quite wrong. Dress and equipment are not just passive artefacts that are hung on soldiers; current understandings of human material culture show that the artefacts and environments that humans construct and inhabit have a much more active, indeed interactive, role in creating individuals, societies and identities (e.g. Schiffer 1999). In the case of Roman and Sasanian soldiers, clothing, armour and weapons did not simply encase the man; they did not simply enable him to live and, sometimes, to fight; nor did they just express his special status as a warrior in visual terms. Partly a matter of personal preference, partly determined by the group, they were actually a vital component in creating his identity, for himself and for others, by physically framing, enabling and obliging him to move, to behave and to appear in characteristic ways which marked him out as part of *this* community of soldiers, of *this* unit, and of no other. Then, as now, the design of helmets – and of tunics, of boots – is intimately and reflexively involved with the creation of the soldier's self-identity, and so with those vital morale factors; they are a fundamental part of the literal embodiment of being a soldier (James 1999).

This identity may be intensified and welded to a remarkable degree on campaign, and especially in the heat of battle, but it is not born there. It is created in camp; during training, working and living together, in peacetime, among groups of soldiers more or less embedded in the world of civilians. Study of dress, equipment and appearance, then, is also about the wider question of soldiers in society, as well as contemporary craftsmanship, and the nuts and bolts of the soldier's profession in peace and war. Such study also brings us close to the physical reality of the soldier's own world, especially the relatively little-known world of the ranks; our knowledge from documentary sources of ordinary Roman *milites*, for example, consists mostly of terse epitaphs, or prose accounts largely written by unsympathetic, contemptuous, or even fearful aristocrats. It is the very personal remains of military dress and equipment, combined with the rich contemporary record of depictions of soldiers commissioned by soldiers, which allow us to approach their creation and perception of themselves (James 1999).

The military archaeology of Dura-Europos and its significance

The story of the rediscovery of the deserted city of Sâlihîyah ('place of Saladin' : Breasted 1924, 50) and its identification as ancient Dura-Europos was discussed in the preface. The most useful account is Hopkins 1979, which also contains an extensive bibliography (for the historical and political context of the excavations see Velud 1988; Gelin 1997; Yon 1997). After the identification of the site in 1920 (Breasted 1922; 1924) the first scientific excavations were undertaken in 1922–3 (Cumont 1926), followed by the main series of excavations, sponsored jointly by the French Academy and Yale University, over ten winter seasons between 1928 and 1937 (Table 1; *Reps*. I–IX, published 1929–52; the report on the tenth and final season was never published but a valuable summary of available information has been produced by Matheson 1992). Funding was heavily dependent on the making of ever more spectacular finds, a pressure which partly accounts for many of the problems encountered below; further planned seasons were abandoned when finance dried up. (Since 1986 field research has been resumed, on a more modest scale but with far more sophisticated methodology and technology, by an international team under joint French and Syrian direction: Leriche *et al*. 1986; Leriche and Mahmoud 1988, 1990, 1994, 1997.)

Dura's military assemblage is of enormous value to Roman scholars, and indeed to scholars studying the Sasanian world, since it includes a number of pieces believed to belong to the attackers. So far as I am aware these are, to date, the only early Sasanian military artefacts known. Arguably, Dura's martial material culture is also of an importance unique in the Roman empire, due to a combination of features:

- the assemblage is very large and highly diverse
- much of it is unusually well-preserved
- it remains the only really major military assemblage from the Roman East
- it was recovered from a remarkably rich archaeological and documentary context
- that context, an urban military base, is unusually thoroughly explored
- much of the material is very closely dated to the mid-250s AD

Dura was always a garrisoned town, and each phase of its existence has left some military traces. Overwhelmingly, however, the military testimony from Dura is the archaeology of a Roman defeat which resulted in the permanent devastation and abandonment of the site. It is to this local military catastrophe, and the consequent snuffing-out of the life of the city, that we owe unique insights into the Roman East and the imperial armies of the third century AD, and some knowledge of their foes.

The military archaeology at the site consists of military equipment and related artefacts, installations (the walls, towers and other buildings, purpose-built and converted, belonging to the garrison) and the siegeworks. The excavations also produced a number of important representations of soldiers and warfare, including 'the sacrifice of Julius Terentius', the only painting of an identifiable military unit from the Roman

world (p. 39; Plate 1; Fig. 18). A rich and celebrated collection of documentary sources was also recovered. This includes a large number of formal inscriptions and graffiti which, although provisionally published in the *Preliminary Reports*, still await definitive publication. It also includes a major group of texts on papyrus (Welles *et al*. 1959).

At a general level, the importance of the Dura excavations for understanding the Roman military can hardly be exaggerated. This is clearly seen in the case of the papyri. For example, of the 134 documents presented in Fink's corpus, *Roman Military Records on Papyrus*, some 83 – no less than 62% – are from Dura (Fink 1971). Kennedy notes that the documents from Dura, especially those relating to 'the duty rosters for [*cohors XX Palmyrenorum*] provide us with hundreds of named personnel, more than for all of the other legions and auxiliary regiments in the entire Near East . . . These are sobering figures. It is only at Dura-Europos that one comes close to the variety and wealth of evidence readily available to the prosopographer of, for example, the British army of the 18th c. onwards' (Kennedy 1996b, 15, n. 2). The Durene data are rivalled only by the military-related papyri from Egypt, and the stream of texts on wood recently appearing from Vindolanda, England (Bowman and Thomas 1994, 1996).

Dura is a site of empire-wide importance, then, in terms of its military documents. It is no exaggeration to say that the same is true of almost every aspect of its military archaeology too, both qualitatively and quantitatively. As a battlefield, with substantial siegeworks in a fine state of preservation and also well explored, it rivals any site in the ancient world, from Alesia (Reddé and von Schnurbein 1996) to Cremna, Turkey (Mitchell 1995), to Masada (Richmond 1962) and Narbata, Israel (Zertal 1995). Perhaps the most interesting comparable case is Hatra, Iraq, but its siegeworks still await a definitive publication (Al-Salihi, 1990, 1991; Gawlikowski 1994b).

Within the more specific context of the Roman East, even a lifetime after its first excavation Dura still stands out as a military site uniquely rich in the range and extent of its data. Solid research on the ground, especially excavations of Roman military stations, remains relatively thin in Syria and elsewhere in the Middle East. Kennedy, in his survey of current evidence, observes that 'it is difficult to escape the conclusion that there has been more fieldwork on, for example, the Roman military in Scotland than in the entire East' (Kennedy 1996b, 12). The East is much less well known than the West, largely because of the concentration of archaeologists, and so of research and publication, in the north-western provinces. Part of the problem has been actually finding the army, especially the pre-fourth-century army, in the East, where it was apparently common practice for Roman troops to be stationed in towns. Dura is virtually the only such urban military base of the earlier empire in the East to have been identified and extensively excavated.

Such, then, is the wider context of the military archaeology from Dura. The portable martial material culture in particular has an equal prominence within its own specialist field. To date, Dura provides almost the only major assemblage of Roman military equipment worthy of the name from the entire Eastern empire. The closest comparable site is Hatra, which has produced a catapult (Baatz 1978) and unpublished material including a shield boss (D. Baatz pers. comm.), mail, arrowheads and arrowshafts (D. Nicolle, pers. comm.). More weapons continue to be revealed by the renewed work at the site (A. Allara, pers. comm.). Swords and scale armour are known from Zeugma (Kennedy with Bishop 1998). There are various other isolated finds from the East, cited in the catalogue where appropriate, among the most important of which are the Nawa material (also known as Tell Oum Hauran: Abdul-Hak 1955) and the Hebron hoard (Weinberg 1979). The Dura assemblage dwarfs these groups, and indeed most site assemblages from the West as well. Only the massive quantities of material found at Carnuntum (see the early volumes of *RLÖ*, particularly II) and Vindonissa (Unz and Deschler-Erb 1997) can rival the assemblage. However, Dura surpasses these in its diversity, and above all in the near perfect state of preservation of many of the objects. The patchy record for the East makes the massive data set from Dura all the more important, though paradoxically more difficult to interpret, since we have, as yet, little understanding of the wider regional background, the archaeological context in which to set it.

Material from the East is growing, then, but remains meagre compared with the West.

The relative sparsity of research in the East seems to be aggravated by factors other than limited research effort: substantial assemblages of finds like that from Dura are very rare in the eastern provinces, even where extensive digging has been undertaken on military sites (see Frisch and Toll 1949, 1). The reasons for this are obscure. There is probably a combination of factors at work here, including a history of poor excavation technique and greater interest in architectural remains than in mundane artefacts. However, this cannot apply to all excavations, and certainly not to many recent ones; it appears that such items really are much rarer survivals in the East than they are in the European frontier provinces. This may be largely due to environmental factors. Even in Egypt, so prolific of remarkable organic survivals in certain environments, metal finds may rarely survive on many sites due to the oxidizing power of salts in the soil (C. Johns, pers. comm.). Such hostile soil conditions are a common hazard in the Middle East: as will be seen, they certainly pertained at Dura away from the special micro-environment of the ramparts. However, it is likely that depositional factors are at least equally significant.

It seems that the imbalance between the Roman East and West in rates of recovery of artefacts is largely due to variations in patterns of deposition across the empire. Differing methods of rubbish disposal have a role to play; in the East material may more often have been deposited off-site, where excavations rarely take place. On the other hand, much of our best evidence from Europe comes from sources which are now believed by many to represent deliberate acts of deposition, perhaps funerary or religious in nature, not least in pits, wells, and bodies of water (e.g. the Kops Plateau hoards at Nijmegen: van Enckevort and Willems 1994; and Newstead: Clarke and Jones 1996; Clarke 1997). Oldenstein notes that 80% of finds of Roman imperial helmets were water deposits (1990, 36). Such patterns seem to have been absent in the East; at least, apart from some funerary deposition (Abdul-Hak 1955), they have not

been detected. Also, great quantities of Roman arms, especially swords, are known from beyond the European frontiers, in funerary contexts and especially in bog deposits (Biborski 1994a; Rald 1994). Rome's eastern neighbours do not seem to have engaged in similar practices, unless, again, they have not been identified or reported. The relative vacuum of knowledge in the East makes the Dura material all the more prominent, but also harder to contextualize. (However, it should also be noted that if we look at the archaeological record across the entire Roman period the general paucity of the military archaeology of the East becomes less anomalous, for there is relatively little martial material from either the republic or the late empire in East or West. From this broader spatiotemporal perspective, it is the remarkably prolific material from early and middle imperial Europe which demands explanation, not the sparsity of Eastern data.)

The geographical unevenness in knowledge is further exacerbated because little of the attested eastern material is properly published or widely known, a point which needs emphasizing. The archaeological evidence on which general statements about Roman weapons and equipment are based is overwhelmingly European, and western European at that–it comes mostly from Britain and Germany. Indeed, other regions are almost as badly served as provinces like Syria. Knowledge of the Danube frontier, especially the lower Danube, is also very uneven in this regard, due to less intensive exploration and patchy or inaccessible publication. Other areas of ignorance are gradually being eroded, at least in terms of the publication of known material, e.g. Mauretania (Boube-Piccot 1994) and Spain (Fernández 1996). To return to Syria, there are a number of very interesting unpublished finds on display in the National Museum in Damascus. While Dura provides an important counterweight to the preponderance of European evidence, we need much more even coverage from these other areas if we are to have any chance of making more detailed studies of the uniformity or diversity of material across the empire as a whole.

The value of the Dura material is greatly enhanced by the fact that much of it is closely datable, having been deposited in sealed archaeological contexts during the siege which can be fixed with confidence in the mid-250s AD (James 1985; p. 11). Since the city was effectively deserted thereafter, this also provides a *terminus ante quem* for the less exactly provenanced items which form the rest of the assemblage. In general, the dating of most of the Dura artefacts is much more precise and secure than is the case for the assemblages from forts on the Rhine and Danube frontiers excavated around the turn of the century, which provide the bulk of our comparative material. Very little of this is adequately provenanced, while the smaller-scale but more scientific excavations of more recent years are only slowly producing properly dated material.

Definition of the area of study

Finds of military artefacts were very common at Dura. Cumont found and published some, and weapons and fittings were turning up during the whole course of the Yale/French Academy excavations. Some further military discoveries have been made (e.g. Gelin *et al*. 1997, 41–2, figs 31–2; James forthcoming). The present Report describes and analyses the material recovered during the Yale/French Academy campaigns; additionally, following the precedent of the report on the parchments and papyri (Welles *et al*. 1959), I have included in the catalogue published details of the finds made by Franz Cumont for the sake of completeness. Work currently under way in Paris on the archive of his activities (P. Leriche, pers. comm.; M.-J. Castor pers. comm.) should shed further light on these.

The artefact publication programme for the Yale/French Academy project seems to have evolved in a somewhat *ad hoc* manner (see the Bibliography where the complete scheme is set out, including unpublished elements). Some parts were published by material and/or method of manufacture (e.g. pierced bronzes, enamelled bronzes and fibulae: Frisch and Toll 1949; textiles: Pfister and Bellinger 1945; glass: Clairmont 1963), others by functional category (e.g. coinage: Bellinger 1949). The decision to define the arms and armour as a category worthy of a separate volume was apparently taken at an early stage, because of the remarkable quality, quantity and completeness of the material. In the event, it became clear to me that publishing the arms and armour in strict isolation made little sense. It would be strange, for example, to study swords without looking at the many fittings from sword-belts, or indeed without considering all the evidence for soldiers' dress which was inextricably bound up with the bearing of the arms. Similar arguments applied to cavalry armour, which demanded the inclusion of evidence for horse harness as part of the panoply. A fundamental argument for broadening coverage beyond armaments *per se* is that the fittings of military dress and horse harness are often made and decorated in highly distinctive ways, and so are among the most diagnostically useful objects for comparison with other sites.

The result has been a decision to republish some pieces, most notably many of the copper alloy items published by Frisch and Toll (1949). They seem to have been thorough in publishing the brooches, so these are not republished here, even though most of them are very probably of Roman military affiliation. However, Frisch and Toll were much more selective and rather inconsistent in publishing dress and harness fittings; for instance, their rationale for omitting unpierced bronze mounts, buckles and other items is unclear. In consequence, all such identifiable fittings are published or republished in a single catalogue here.

However, there remain problems in deciding the boundaries of the material to be included. What constitutes a military artefact? Many items, such as simple studs, could be used for a variety of functions, either civil or military (Allason-Jones 1999). In such cases, many of the identifications as military must be regarded as provisional. Of course, there never was an exact boundary between civil and military artefacts, especially among peoples whose males may have been part-time warriors and who may have used the same artefacts for both warfare and peacetime pursuits. For example, in the Roman world military and civilian horse harness may have been largely indistinguishable, while some weapons may have been used for the hunt or, in other societies, as symbols of free manhood as much as for combat. Roman Dura also had an amphitheatre, suggesting another field of armed violence, not necessarily military *per se*, in the city. So while some types and classes of artefacts may be taken as unambiguously military, as

having no other known use (e.g. torsion artillery), or as possessing internal or external military associations (shields and swords with specifically military symbolism, or which appear in representations of soldiers), the 'militariness' of some artefacts may be a matter of context, practice and of perception (archery equipment, much horse harness).

Consequently I have aimed at inclusiveness, so some possibly civilian items are incorporated (e.g. some of the small pendants). On the other hand, I have not included every item which *might* be military – e.g. many small bells and plain metal rings, some of which could well be from, for example, military horse harness (the Beuningen horse-bridle included a bell: Zwart 1998, no. 17); however, in the absence of any diagnostic context, they could have been used for a hundred other purposes. Many of the small bells, at least some of which come from the necropolis, are apparently from female dress (Musche 1988, 173–5; *Rep*. IX.ii, 121–2).

Finally, there is also the effect of my own selection from the mass of material at Yale, much of it in very fragmentary or corroded state. It is regrettable, but inevitable, that I must have missed things.

The range of material

While we might expect that much of the material recovered would belong to those who occupied the town for so long, and to those defeated in defending it, some might also be expected to belong to the attackers. The difficult question of attribution is discussed later (pp. 238–42). However, the assemblage contains most of the categories familiar from Roman military sites in Europe: fragments, mostly of metal, representing body armour, helmets, swords, daggers and belts, shield fittings and equestrian equipment. There are also many projectile heads, and numerous stone catapult balls were found, although few were preserved or recorded in detail.

Dura's greatest importance derives from the remarkable preservation of organic materials in some parts of the site, resulting in survival of items in a state of completeness rarely, if ever, seen before. Painted wooden shield-boards, complete scale armour garments in leather or in metal with textile backing, and the shafts of arrows and catapult bolts are the major classes of discovery.

The assemblage also includes items not encountered before in the archaeology of the Roman world, such as an incendiary ballista bolt-head of a type described in ancient sources but of which no examples have previously been recognized (**804**; James 1983). There is also a superb iron helmet, which is one of the most important individual objects, anticipating as it does the construction of fourth-century Roman helmets (**371**; James 1986a).

No components of artillery or siege engines were recognized; nor did I identify equipment such as entrenching tools or fragments of tents. Some such items may remain to be identified in the Dura collections.

Aims of the present research

The main initial aim in taking on the task of publication of the long-projected *Final Report* was of course to produce a catalogue of the material but, in the process, it also provided the opportunity to pursue my own wider research interests, using the assemblage to address broader questions in Roman military studies and other fields, not least aspects of the archaeology of Middle Eastern peoples of the era.

Perhaps unsurprisingly over such a long period of intermittent and incremental work, as the wider context of archaeological thinking has evolved, and as my own interests have developed, the research design of this project has also changed considerably. It has, for example, broadened out into work on the Roman army in its social context at Dura and beyond, which will be pursued in further studies. My original interest was in using Dura simply as a case-study for issues regarding the Roman military as a whole; however, I soon came to realize that the collection, although unsurprisingly it seems to contain few remains belonging to the victors, nevertheless had many valuable things to say about the military aspects of the peoples of Syria, Mesopotamia and Iran during this era; and that paradoxically we might also better understand the Roman remains, and so better answer the original research questions, if we paid the non-Roman evidence due attention. Nevertheless, I remain primarily a Romanist, without the equivalent depth of expertise in these Eastern cultures, and the collection does still seem to be overwhelmingly Roman; yet I still hope that the resulting study is not as 'occidentocentric' as it might have been.

Initial research questions

The major initial research issues, not in any order of priority, were as follows:

The nature of middle imperial Roman military equipment

The quality of the Dura assemblage, supplemented by visual representations of soldiers and warriors from the site (pp. 39–46), clearly offered the expectation of improving our general understanding of the arms and accoutrements of middle imperial Roman armies. Further, the material would probably tell us much regarding how different items were worn, carried and used, and in which combinations; in short, they would help us understand what Roman soldiers actually looked like under arms. Attempts at reconstruction were to be one of the aims of the project. The assemblage was also thought data-rich enough to attempt investigation of the following related but more specific questions.

Regionality in the Roman military: the army in the East

Of equal interest is the problem of regional variation in arms and armour. The armies of the East were perceived by contemporary metropolitan Roman writers as being different from those of Europe. By the third century, they mostly consisted of units stationed in the East for centuries, or raised there *de novo*. The Roman armies on the eastern frontier faced very different physical, strategic and tactical environments from those confronting their European counterparts; had their equipment diverged from that of the armed forces of Europe? Had it become functionally and stylistically 'orientalized'? There are resons to suspect this may have been the case. The Roman military is well known for adopting the arms of its enemies. Eastern horse archer regiments were added to the army, and units of fully-armoured cavalry probably had a mainly Eastern pedigree. Some items of equipment found elsewhere in the

East, such as certain cavalry sports helmets, seem to show signs of Middle Eastern stylistic influence (e.g. an example from Emesa: Robinson 1975, 121 and plates 349–51). Further, was Eastern equipment in any sense ‘old fashioned’ or qualitatively inferior to that found in Europe? Some might expect so: Eastern troops had a reputation for not being as good as Western armies (MacMullen 1963, 178; Watson 1969, 119).

Eastern Roman armies and Orientalism

It was mentioned above that, as fighting forces, the Roman armies of the East have had a bad press, being regarded in both ancient and modern writings as of poorer quality than their European counterparts. There is the strongest reason to suspect that this has been largely, if not entirely, due to ignorance of, and prejudice against, all aspects of life in the East, part of a wider Orientalist devaluing of the Levantine world and its peoples inherited from Roman times (Said 1978; Wheeler 1996). Dura provides a chance to investigate some of these issues through an in-depth study of soldiers of the Roman East. Seen in the context of representations and texts from Dura, what does the evidence for arms and equipment tell us about the real nature of eastern Roman soldiers?

Standardization and specificity of Roman equipment

In contrast to regional peculiarities, can the collection help us understand how far basic items of equipment were standardized across the Roman armies? On the other hand, were there particular, consistent distinctions in items of dress and equipment according to unit type, or to the tasks or mode of fighting of certain groups of soldiers within a unit? At a general level, this is already detectable, as horse harness from the station of a *cohors equitata* may be reasonably equated with its cavalry element, but can more subtle equations be made, such as the association of armour or helmet types, or even dress fittings, with particular groups? Such ‘specificity’, often assumed for certain types of armour in particular, is an issue which has received little detailed attention (Johnson 1980, 312; Bishop and Coulston 1993, 197–8). Because so much is known about Dura’s third-century garrison from epigraphic sources, it was also hoped that it might even be possible to link particular equipment or types of equipment to named units.

Evidence for warfare in the Roman/Partho-Sasanian frontier zone

Since so much of the material was deposited under circumstances of actual combat, notably in the dramatic Tower 19 countermine complex (pp. 34–7), it clearly has much to tell about the realities of warfare between the two empires. Since a comprehensive study of this aspect must necessarily involve a full consideration of the battlefield archaeology (Freeman and Pollard 2001), which is being studied afresh by Leriche (1993a), coverage of this aspect will be limited in the present work.

Partho-Sasanian and Syro-Mesopotamian military remains

It was clear from the beginning that some of the material was foreign to known Roman traditions, and that, given the city was the scene of a Roman defeat, some at least of the material might be expected to belong to the victors. This would be highly valuable, since well-provenanced and closely dated archaeological remains of Sasanian armies in particular are exceedingly rare. However, the ‘Sasanian’ empire was very far from being culturally homogeneous (p. 14). Sasanian armies operating in the West are likely to have drawn heavily on vassal polities in Mesopotamia and other peripheral regions, which may well have had their own, as yet hardly studied, indigenous traditions of military equipment very different from those of the Iranian heartland of the Persian state or the Graeco-Roman Mediterranean. These, too, might have left traces at Dura.

Evidence for earlier military traditions

There was also good reason to believe that some of the material recovered belonged to the pre-Roman life of the city, and was deposited during its Hellenistic and Parthian phases.

Patterns of deposition within the city

Given the relatively detailed information regarding find-spots of many items within the city, and the apparent rapidity with which most were deposited during the siege, it was hoped that plotting distributions might reveal structured patterns giving additional information about the garrison, the course of the siege, or both.

Supplementary research questions

During the course of the project, further areas of interest arose as a result of work on the above issues, and background research:

The nature and meaning of Roman military dress

It became clear that much of the richest military evidence from the site, both archaeological and representational, related to the clothing, accoutrements and appearance of third-century Roman troops in ‘camp dress’ more than in battle order. It was in camp dress, it seems, that soldiers spent the majority of their time, and most often chose to have themselves depicted. As discussed above, dress and appearance were an active part of the constitution of military identity, and the more the evidence for camp dress was studied, the more it seemed to reveal about the construction and expression of the identity of the *miles*, at Dura and elsewhere in the empire.

The Roman military community at Dura

Dura provides an opportunity, almost unparalleled in diversity and depth of evidence, to study in detail a Roman military community in its context, looking at the interaction of soldiers, their civilian dependants and the ‘matrix’ of local civil society in both peace and war. The equipment itself, the most tangible evidence for the bodily presence of the mass of the soldiers, provides one tool for this wider aim, to be used in combination with the other major sources of evidence – structures, papyri, epigraphy, etc. – to try to build up a composite picture. This as yet incomplete work will largely be published elsewhere.

Previous work and publications

A number of individual objects have been more or less fully published in the *Preliminary Reports*. Of these, the most

important are the horse armours and the painted shields (*Rep*. VI, 439–49; *Rep*. VII/VIII, 326–69). Other objects were given varying degrees of coverage, many getting no more than a bare mention. Other *Final Reports* also include some items of martial equipment, partly because of the ways in which the subject material was divided up for publication, and also because some have only subsequently been recognized as military (e.g. the probable helmet liner **378**). In particular, the great majority of the metal fittings published by Frisch and Toll are certainly or probably military (Frisch and Toll 1949). Publication references for individual objects will be found in the catalogue. Since the *Preliminary Reports*, no general account of the material has been published except a brief paper by the author (James 1997).

Since the excavations, some specialist work, largely unpublished, has been carried out on identifying the organic materials, especially the wood species used in the catapult bolts and wooden shields, and the pigments used on the latter. No synthetic report on the leather objects from Dura has ever been published, although in 1953 conservation work and a start on cataloguing was conducted by the late A. Gansser-Burckhardt. His unfinished work was used by Barry Kaplan to produce a manuscript catalogue now at Yale (Kaplan 1971). A manuscript catalogue of the worked bone exists at Yale (Russell 1976; on Roman militaria in ivory, see von Carnap-Bornheim 1994a, 27). There has been virtually no analysis of the metal items (although see Lillios 1983 for metal analyses of **533**, **535** and **547**). A lot of work remains to be done, especially on the textile backing and stitching, and the leather-and-rawhide edging, of scale armour.

Before the present research, the only substantial programme of work carried out on the assemblage since the excavations was that of the late Donald R. Wright, who forty years ago submitted a Scholar of the House paper on the weapons to Yale University (Wright 1963). Apparently this was to have formed the basis for the *Final Report*, but Wright made no further progress on the subject before his untimely death. It includes an essay at a catalogue, lacking any scale drawings or photographs, and a discussion containing errors of fact and interpretation which suggest that Wright was unfamiliar with Roman military equipment, and had insufficient time to work on the archive. However, the paper does contain items of new information, and it is easy to criticize with the benefit of another generation of research which has seen numerous discoveries and a greatly refined understanding of the subject (Wright's work was discussed and critiqued in detail in my thesis: James 1991).

A considerable proportion of my Dura research has also already been published, on the date of the fall of the city (crucial to understanding the historical context of deposition of the arms: James 1985) and particular aspects of the material itself (James 1983, 1986a, 1987, 1997).

Methodology

For a valuable general discussion of the methodological problems of dealing with archaeological remains of military equipment, see Bishop and Coulston 1993, 33–41. The fieldwork on which the catalogue is based took place during visits to New England in 1981, 1982, 1992 and 1997, to the Royal Ontario Museum in 1992 and to Damascus National Museum in 1993, totalling about three months.

The research was based almost entirely on naked-eye examination of the objects, backed up by reference to the Yale archive. A number of items known from the records could not be located; some of these may never have reached the museum collections. Some of the Damascus material was not accessible, and according to the National Museum authorities may no longer exist. In such cases published accounts and the archives were used.

Where specialist analysis has been carried out (e.g. Lillios 1983) it was of course used, but many questions of materials identification and metal analysis await future work.

Pieces were generally identified and categorized by reference to previously published archaeological discoveries, mainly at Roman military sites on the Rhine and Danube frontiers and in Britain, due in large measure to the greater density of research and publication in those areas. Of course, wherever possible parallels were sought in the Roman East, the territories of the Sasanian empire, and beyond. However, relatively little information is available in terms of excavation and publication from many regions, resulting in a heavy bias towards comparable material from the Roman empire, especially the northern *limites*.

This is, then, an archaeology led study, which also draws on other sources of information, not least representations, where these illuminate understanding of the artefacts. There are few surviving documentary sources of direct relevance to the military equipment from Dura (and this includes the papyri from the site itself). There are not even any particularly useful historical works by classical writers covering in any detail the main period of deposition, the mid-third century AD, from which information on weapons could be drawn. Instead, slightly earlier and later works have been used (e.g. Cassius Dio and Ammianus Marcellinus) to provide a general picture of weapons and tactics of the era. Other sources from more distant periods have been employed where they appear to be helpful; the rule of thumb used is that ancient sources are quoted where they clearly or probably describe the form or use of material attested archaeologically. Consequently such sources are used sparingly, as they suffer from a number of their own inherent problems, not least the failure to use technical terms properly or consistently (even Ammianus, a professional soldier, used obsolete terms for literary effect). On the other hand, some terms perhaps used properly may not be fully understood today (for example, descriptions of incendiary projectiles were imperfectly interpreted until examples were found: Brok 1978; James 1983).

Organization of the *Report*

The aims of the following study are, initially, to describe the objects from the excavations in their own right, and to look at their individual affinities and parallels. This is presented in the form of a descriptive catalogue, which is intended to present as much of the surviving information as possible about the discoveries at Dura–including details, often sketchy, of items which no longer survive. The whole assemblage is considered within its context at Dura, and against the wider historical background, in order to pursue more general questions relating to the implications of the material.

The unusually complete nature of the assemblage demanded that the catalogue be organized on a functional basis, rather than by material of manufacture, as has traditionally been the practice with collections of more fragmentary remains from British sites. Arrangement by functional categories (e.g. helmets, edged weapons, etc.) is potentially much more informative. The catalogue section dealing with each group is prefaced by a discussion. Of course, as will be seen, this creates its own difficulties, as function is often much less obvious or certain than material of manufacture, and the exact boundaries of what should be included are also far from clear in many areas (p. 7).

Almost all the objects discussed (except artillery ammunition) comprise items designed to be worn or carried by individuals, or their horses. The general logic that dictates the order of the sections is, as far as possible, to describe categories of artefact in order of closeness to the body. Starting with military dress plus fittings from horse harness (grouped together because the evidence for both consists largely of metal components which share so much in common that some are indistinguishable), the catalogue progresses to helmets, armour, swords and other bladed weapons and their scabbards. It then proceeds to items which were hand-held, i.e. shields and shafted weapons such as spears, and finally to projectile-shooting weapons (i.e. archery equipment and artillery ammunition).

Citation of parallels is not intended to be exhaustive, but to help with interpretation of the function of items and to give some idea of their geographical affiliations. Archaeological research varies widely in extent, degree of publication and accessibility across Europe, the Mediterranean and the Middle East. Few areas have the kind of convenient corpus which exists for the Roman auxiliary forts of Upper Germany (Oldenstein 1976) or the province of Mauretania (Boube-Piccot 1994). However, where such syntheses exist, I have made a conscious decision to cite parallels through them rather than always citing the primary publication, for two reasons: firstly, original publication of many key items is often in volumes which are not readily accessible to many potential readers; and secondly, references to these are in any case to be found in the corpora and syntheses, which themselves are essential to appreciation of the wider context, more recent literature, and current understandings of the pieces in question. For the same reasons I have made extensive reference to the relatively accessible and invaluable survey of Roman military equipment by Bishop and Coulston (1993), which both contains many examples and also sets out the current general interpretative framework within which I am writing.

All objects are illustrated, except where specifically indicated in the catalogue. In most cases a choice between a photograph and a line illustration had to be made on grounds of cost and space. Photographs are presented of the larger, more elaborate and better preserved items, and also of pieces where drawing was impracticable or less informative (e.g. relatively shapeless lumps of corroded iron mail). Most of the smaller or fragmentary pieces are presented visually through interpretative drawings. Since these can offer multiple views, sections, and/or explanatory sketches of often corrosion-obscured and fragmentary objects, they frequently provide a more effective means of conveying diagnostic information than either photographs or text.

Notes on illustrations, conventions and terminology

Illustrations

All illustrations are figures, except the colour plates. Where possible these are original photographs (my own or from the Yale archives) or my drawings made directly from the objects. Drawings are reproduced at natural scales, generally 50% or 25% linear. For items which can no longer be located, the best available archive drawing, or a new drawing from a file photograph, is presented. As these are not taken from original objects, and the accuracy and/or scale of the representations are therefore uncertain, they are separated from directly-made object drawings by a box.

Cross-referencing between text and illustrations

For ease of linking text and images, the object illustrations are as far as possible arranged in catalogue order, and illustrations of particular objects are placed as close to the relevant catalogue text as is practicable. Catalogue numbers are picked out in **bold** throughout. It should therefore be fairly simple to cross-refer between most images and descriptions without needing to consult figure numbers. This avoids cluttering the text with a proliferation of page and figure cross-references. The main exceptions are the colour plates which had to be grouped separately for printing reasons, and the relatively small number of items which appear in more than one illustration, or are illustrated out of catalogue number order for other reasons. In these cases, full cross-references are provided in the catalogue.

Dimensions

All dimensions are given in SI units (e.g. metres and millimetres). In the catalogue, dimensions given with a plus sign (e.g. 68 mm+) indicate the maximum preserved dimension, signifying that the object is incomplete.

Terminological note: 'copper alloy'

In British archaeological publications it is now standard practice to use the phrase 'copper alloy' rather than the metallurgically-specific 'bronze', since the alloys used in Roman 'bronze' artefacts varied greatly from true copper/tin bronzes to high-zinc brasses; cast components also often contain a proportion of lead. In the general absence of compositional analysis, 'copper alloy' is therefore preferred here.

The historical and geographical context

Because there has been extensive new research since the last synthetic publication (Hopkins 1979), it is useful to present some brief summaries of the environmental, geographical, cultural, historical and military contexts of the site and its material.

An outline history of Dura-Europos

The site of Dura-Europos overlooks the Euphrates, roughly 60 km downstream of Circesium and the confluence of the

Chabour. A Seleucid foundation, the military colony of Europos was established in 303 BC as a garrison on the royal road running up the south bank of the Euphrates, connecting Babylonia and the eastern capital of Seleucia, near Babylon, with Antioch and Syria. The site encloses a bottleneck on this route. Here, where the river has cut into the edge of the steppe or semi-desert plateau in a series of cliffs, the road was forced to pass from the low ground to the plateau via a wadi, which is flanked by two other, steeper, ravines (Geyer 1988; Figs 1, 2, 5). It is an obvious location for military control of the route and the region. Some evidence of pre-classical activity has been found at this spot, which was already known in the local Semitic dialect as Dura ('fortress') before the Macedonians arrived (Breasted 1924, 37). Recent research has shown that Europos grew slowly from a modest fortified settlement, and was only laid out as the large walled Hippodamian city we see today in the mid-second century, late in Hellenistic times (Leriche 1993b). Dura was recorded by Isidore of Charax as 'Dura . . . a foundation of the Macedonians, called Europos by the Greeks' (*Parthian Stations* 4; Breasted 1924, 37–8). 'Dura-Europos' is a modern compound not used in antiquity; the city was called either 'Dura' or 'Europos' at different times and by different groups.

Wharton has recently rightly criticized the primary characterization of Dura in many accounts as 'a peripheral military outpost of western imperial power' (1995, 19); for most of its history it plainly was not, although in its latter years this did become increasingly true, and was the reason for its destruction. While it apparently always had a garrison, of troops loyal to Seleucid and then, from *c.*113 BC, Parthian power (Leriche 1996), for most of its existence Dura was predominantly a Mesopotamian civilian community with a Greek aspect. The basis of its economy is disputed. It has been seen as a nodal point on the caravan routes, both to Syria and, via a more southerly track across the steppe, to Palmyra and the southern Levant. Certainly, the close connection with Palmyra strongly influenced the life of the city. However, others have suggested that this is exaggerated, and that Dura was not primarily a caravan city. The evidence suggests that it was a provincial town living off the land; it directly overlooks the rich plain of Mesopotamia, immediately across the river (Gawlikowski 1994a, 27; see below).

Roman power was established in Syria in the first century BC (for treatments of Roman Syria and the East see Alcock 1997; Ball 2000; Bowersock 1989; Millar 1993; Rey-Coquais 1978, 1989; Sartre 1991, 2001). With the establishment of a trend of intermittent but long-term Roman aggression against the Parthian empire (Kennedy 1996c), the military aspect of Dura's existence became increasingly significant. A Parthian stronghold in the first and early second centuries AD, it was captured by Trajan during his Mesopotamian expedition. The Romans held Dura under Trajan long enough to build a triumphal arch, probably erected in early AD 116 (on imperial titles, see *Rep*. IV, 4, 55–68; Lepper 1948, 103). But the city was not held long, and may even have been evacuated before Trajan's death (Teixidor 1987, 187–8).

The town was permanently annexed by Rome in AD 165, during the campaign of the Syrian-born senatorial commander Avidius Cassius (Kennedy 1996b, 9; Millar 1993, 115–17). New evidence suggests it was taken by siege (Leriche and Mahmoud 1994, 411; 'Abdul Massih 1997). Thereafter the city was an increasingly important Roman military base and river port, probably the largest of a series established on the banks and islands of the Euphrates close to the limits of Roman territory (Figs 2 and 3; Gawlikowski 1987). The Euphrates did not constitute a frontier between Rome and Parthia/Persia during this period. Rather it was a key axis of communication – and invasion – between the heartlands of Syria and Babylonia (Fig. 3, top; Gawlikowski 1987). Dura itself appears to have served as a forward staging centre for the eastern operations of the Severi, but with the collapse of Parthian rule and the establishment of the Sasanid Persian dynasty, the balance of power tilted against Rome and Dura became the kingpin of the forward defence of Roman possessions on the Euphrates.

Dura, in the province of Syria Coele, was made a *colonia*, perhaps in AD 204 (Sartre 1991, 341). The face of the city was much altered by the permanent presence of the Roman military. By the early third century a part of the intramural area had been requisitioned, many buildings had been modified and many more created, and military inscriptions and graffiti appeared in various parts of the town. Work by Pollard (1996, 2000) emphasizes the dominant role of the army in the life of the city during its final decades, when Dura was indeed overwhelmingly a focus of military power on the eastern limits of the Roman empire.

Its role in the complex wars of the first half of the third century is not very clear. However, in its last years it was the seat of the *dux ripae*, apparently the military commander of the Middle Euphrates district, who would presumably have controlled the legionaries and auxiliaries based in the town and nearby stations (p. 20; Fig. 3, bottom). However, these special measures were not enough to save the province; they failed even to save the city from the attacks of Shapur I.

The history of the AD 250s is confused and obscure, and it is now almost certain that Dura was taken by the Persians briefly in or about 252–3 (pp. 23–4). The Romans were holding the town again in 254, and were soon making massive preparations to withstand a siege (p. 30). The expected blow fell, perhaps in 255 but most likely in 256, and after a bitter struggle, about which the archaeology is eloquent but history silent, Dura was overrun and destroyed. The population was apparently deported, and after an ephemeral and apparently short-lived Persian occupation (Leriche and Mahmoud 1994, 417) the town was abandoned, never to be reoccupied on a significant scale, although some very limited later occupation has recently been identified in the south-east corner of the city (Saliou and Dandrau 1997). Dura was probably deserted because, in the see-saw wars of the third century, neither side had proved able to hold it. However, since its abandonment resulted in the survival of so much which was rediscovered in the twentieth century, the city's tragic death has ironically provided us with remarkable insights into its life.

The physical environment and climate of Dura-Europos

What was the local environment like, the year around, for soldiers and civilians living at Dura? The following summary is mostly taken from Geyer 1988.

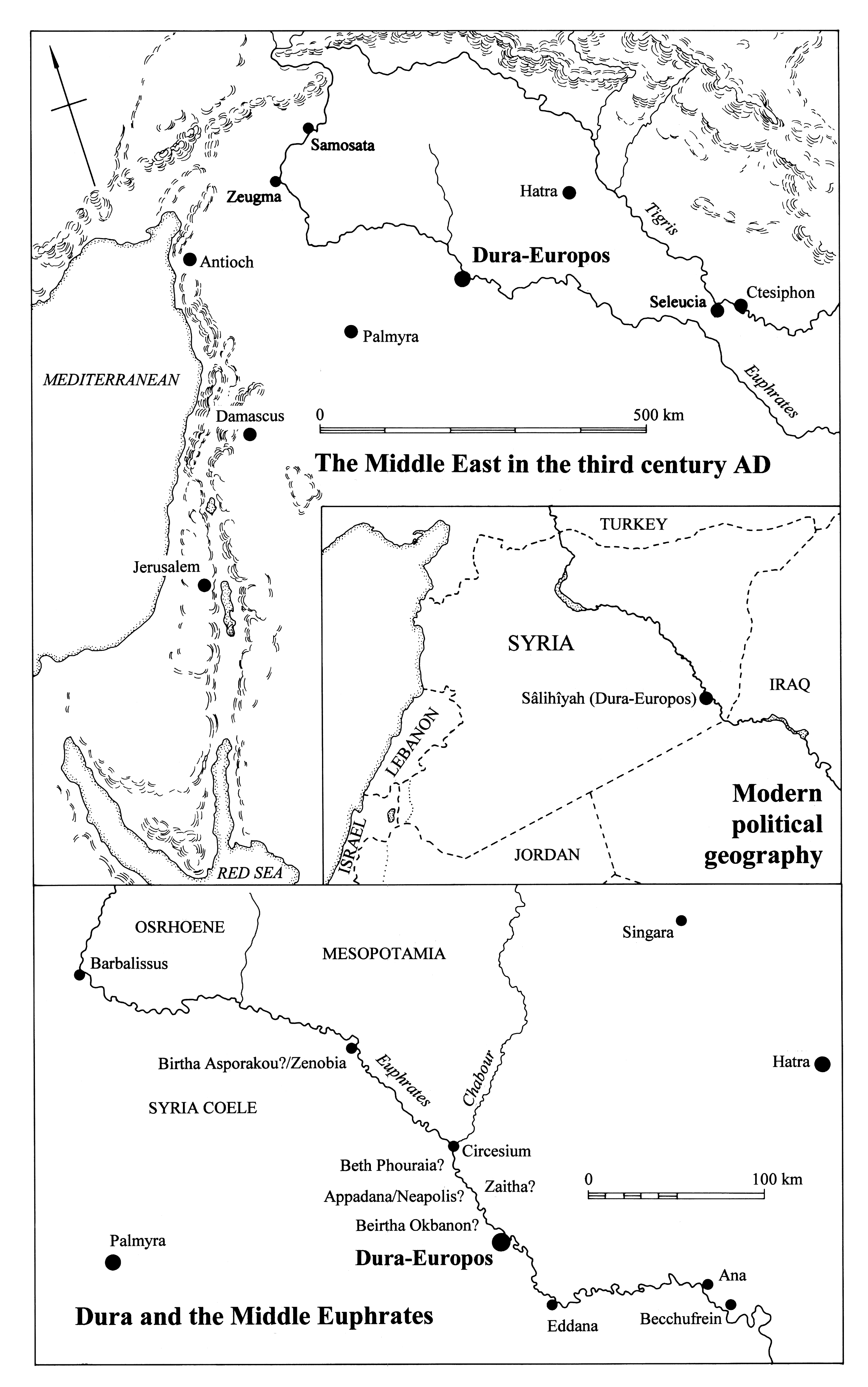


Figure 3 Location maps: the Middle East in the third century AD; the Middle Euphrates in the third century; and modern political geography (after Millar 1993, and Kennedy 1996a).

Dura-Europos lies at the boundary of two ecological zones, steppe or semi-desert plains and the Euphrates river valley. In this region the river snakes generally south-east, the fertile floodplain, 5–15 km wide, constituting a ribbon oasis between the two steppe plateaux of Shamiyeh to the west and Jezireh to the east. Today, the river itself is $\frac{1}{4}$–1 km wide, with many meanders, and has shifted extensively and frequently since Roman times.

At Dura the Shamiyeh plateau comprises soft gypsum strata, overlain by a layer of tough limestone which forms a good foundation for buildings. The plain is very even but slopes slightly towards the river, which in ancient times had at this point a series of cliffs cut into it, broken by steep wadis. It is unclear how close the often-shifting river was in the Classical period to the cliffs on which the city stands, but there have been substantial falls due to undercutting since then.

Dura was established at a point where two wadis form a peninsula, with precipitous natural defences on three sides, the fourth secured by the construction of the 'desert wall'. This area also enclosed a more gently sloping ravine which allowed road access from the steppe plateau to the river plain.

Modern palaeoclimatic research for this area is lacking, but such information as we have suggests that the climate in late antiquity was not greatly different from that of today, arid with two seasons: hot, dry summers and cold winters with but little rain.

There are strong daily temperature fluctuations and pronounced seasonal variations, from extreme heat on summer days (at Abu Kemal, the thermometer can hit maxima over 35° C on 110 days of the year) to often biting cold, and even sub-zero temperatures in winter (*Rep*. IV, 2). The latter can be exacerbated by the chill factor of frequent strong winds (e.g. *Rep*. II, 2). Blowing across the steppe, these bring quite frequent dust- or sand-storms. The insinuation of dust everywhere and into everything is always a problem for human life (Hopkins 1979, 66).

Rain is irregular and meagre. On average less than 100 mm a year falls at Abu Kemal, and even this is highly variable, with frequent dry years: Dura may sometimes see less than 50 mm in a year (Sanlaville and Traboulsi 1996, figs 4, 6, 8). When storms come, they can be torrential, and can render the plateau surface a sea of mud (Hopkins 1979, 118). However, at Dura much runs straight off the surface into the ravines and the river, while much of the rest quickly evaporates due to low humidity and the wind.

This raises the key issue of the water supply at Dura, which has no known aqueduct system. Many houses had cisterns, which presumably collected rain from roofs. Wells are known, but have not been properly explored (Allara 1988, 335–8). Most water was probably drawn straight from the river (A. Allara, pers. comm.), brought up either on donkey-back, or perhaps by mechanical means from the cliff-tops. The river is swift-flowing, and so this need not necessarily result in proneness to disease, especially for those accustomed to the local aquatic micro-organisms; drinking the river water causes few problems in the region today (A. Allara, pers. comm.). Was Dura a healthy place to live in other respects? Drains have been found there, but the extent and effectiveness of sanitation is unclear (Allara pers. comm.).

Food supplies were probably good. Irrigated arable farming was probably practised across the river, and would have been the main source of the city's food. For livestock, pasture was presumably available in the valley, with seasonal rough grazing for sheep and goats on the steppe, where, after periodic wet winters like that of 2000–1, spring vegetation can be quite lush. The steppe will have supported much more wildlife in antiquity, especially game species. Hunting of lions and other species was depicted in the city (Fig. 17).

Human geography of Dura and its region

Dura lay midway between the heartlands of Roman Syria and the Parthian royal capitals of Mesopotamia. Indeed, as the crow flies, it is slightly closer to Ctesiphon than to Antioch (Fig. 3). Although a Greek foundation, then a Parthian and ultimately a Roman possession, the city was set in a generally Semitic cultural matrix which might be called Syro-Mesopotamian, and which already included people who had long thought of themselves as Arabs (Gawlikowski 1997; Hoyland 2001). Dura's social and cultural affiliations, from political and trading contacts to its artistic styles, were with other major cities and peoples of the region – notably Palmyra and Hatra (Bertolino 1997; Leriche and Bertolino 1997) – rather than with either the classical Mediterranean or Iran. The Euphrates itself linked Dura with the great cities of Babylonia.

At a more local level, the city's cliff-top location, *c*.40 m above the Euphrates, dominates a wide stretch of the fertile valley. Although little is known in any detail of the regional pattern of settlement, the documentary evidence preserves numerous place names of towns and villages, and alludes to the intensive agricultural exploitation of the valleys of the Euphrates and its tributaries, such as the Khabur, which was needed to support them.

Communications across the region are understood in outline, if not in fine detail. Dura itself was a major road junction on two axes. The first was the valley highway from Babylonia to Syria which, as we have seen, was Dura's original *raison d'être*; the Seleucid royal road followed the river's course, partly because it formed a fairly direct line between Ctesiphon and Antioch, but also because it constituted a linear oasis (Gawlikowski 1987). Secondly, there was the route across the steppe to Palmyra in the west and Hatra in the north-east, which was of equal importance to the Durenes (Fig. 3).

For bulk goods, water transport was generally vastly cheaper than road haulage. The Euphrates was navigable along much of its length, especially for moving people and *matériel* downstream with the current, and Dura would certainly have been an important river port with quays now lost to erosion. From the Roman military point of view after the annexation of Dura, at least during certain seasons when the water levels were adequate, the river formed an ideal means of bulk transport for the movement of troops, equipment, and supplies from western Syria, the Mediterranean coast and beyond, on ships or barges running down with the current to sustain Dura and the other Middle Euphrates stations. (Upstream transport against the strong current was apparently not possible, although it is unclear whether it is true that on the Middle Euphrates vessels could only make one-way trips and were broken up on arrival.

Perhaps empty barges could be towed back along the banks on some stretches at least: see Dabrowa 1997.) Perhaps the most impressive account of the use of the Euphrates for military traffic is supplied by Ammianus, who provides an eyewitness account of Julian's Euphrates fleet in AD 363. It included a thousand cargo-boats of various types, plus fifty warships and fifty pontoons for bridges (Ammianus 23.3.7). The river was also used to move bodies of troops, as well as supplies (Ammianus 24.7.5). Severus had also sailed an army down the Euphrates (Dio 76.9.3). Local evidence for routine military transportation on the river comes from a recently discovered papyrus from the Middle Euphrates region, recording the sale of a boat on the river by a pilot (*gubernator*) of *legio XVI, Flavia Firma*, in AD 232 (Feissel and Gascou 1989, 540, no. 11, 7–8). This probably records a regular system of military communications, linking military detachments scattered along the river between the legionary bases at Zeugma and Samosata and places like Dura.

The military organization of the Roman empire

The Roman military seems very familiar, and the literature on the subject is vast (for general introductions to its history and organization, see Le Bohec 1994; Webster 1985). However, much of what has been written has been from particular, often quite narrow, viewpoints, and the entire subject currently stands in need of a major reappraisal (James 2002). The third century AD, and the Roman East of any period, have been relatively poorly served by the literature, although the latter has benefited from a recent surge of interest (e.g. Dabrowa 1994; Freeman and Kennedy 1986; French and Lightfoot 1989; Isaac 1992; Kennedy 1996a).

During the middle empire, military action was overwhelmingly the prerogative of the emperor. Local, city-based civil administration had some powers of policing, and town militias appear as at least an emergency measure in some areas, but ultimately enforcing peace and waging war was a central responsibility. According to current estimates the Roman military of the time consisted of rather more than 400,000 long-service professional soldiers, men who by this period constituted a largely hereditary military class, mostly stationed among and raised from the peoples of the frontier provinces. Many other soldiers were raised from elsewhere, within and, not least, beyond the frontiers. The soldiers (*milites*) were ethnically diverse, but all swore an oath of loyalty to the emperor. Their sense of identity was complex, being overtly Roman but often also preserving some aspects of the original ethnicity of the unit if it was an auxiliary formation, like Dura's *cohors XX Palmyrenorum*, the 'Twentieth (Palmyrene) regiment'. Roman soldiers, especially of this period, were boisterous and increasingly difficult to control (James 2002, 39–42), but usually seem to have been quite well trained and equipped, had fairly high morale, and could be as highly effective as any of their forerunners when well led (Goldsworthy 1996).

The basic formations into which the *milites* were organized were permanent units, many of which were well over two hundred years old when Dura fell, although entirely new formations were raised periodically. Apart from imperial guard units and the fleets, most *milites* were in legions (around 5,000 heavy infantry); the smaller auxiliary regiments were called *cohortes* (infantry of various types), *cohortes equitatae* (mixed formations of horse and foot) or *alae* (cavalry). These were 'quingenary' units of around 500 men, or 'milliary' formations, usually around 800 strong. Units of 'irregulars', called *numeri*, were smaller still.

These permanent formations were grouped together into provincial garrisons under the command of the governor of the province, usually a senator who was both civil administrator and general. Provincial armies (*exercitūs)* were, by this period, also more or less permanent groupings; many units had been in the same province, and often at the same base, for generations. Such standing armies were expensive to maintain, but troops were available the year around for internal surveillance, policing and repression, and for external projection of force. They were used to keep order and maintain imperial control of the provinces, to defend them against any external threat and to provide contingents for the temporary, composite field armies, usually led by the emperor himself, which were the usual means of fighting major wars of defence or aggression, especially in the East. (It should also be noted that, in wartime, Roman campaign forces regularly included contingents of allies and irregulars, raised locally or sometimes from distant frontiers.)

In the later second century the standing army of Syria (*exercitus Syriacus*: Speidel 1992, 16) consisted of three legions, roughly 15,000 troops, plus broadly similar numbers of *auxilia*. These formed the central component of a force of about eight legions and almost 40,000 auxiliaries – a total of nearly 80,000 men – which held Rome's Asiatic possessions (Kennedy 1996b, 84–6, tables 1–2).

The middle imperial period is still often seen as a time of essentially static frontiers and increasingly defensive Roman posture, but this is very misleading, especially in the East. Roman imperial ideology continued to be expansionist, and during the later second and early third centuries AD a string of emperors involved themselves in eastern wars, almost all of which clearly amounted to Roman aggression, pushing the boundaries of Roman power eastwards into Parthia (see Kennedy 1996c, for a valuable survey of the strategic relationship of the two empires).

The military organization of the Parthian and Sasanian empires

> the Crown-Prince of Parthia . . . has arrived on the banks of the Euphrates with a massive Parthian army and a large force in addition, drawn from many different nationalities . . .
>
> (Cicero, *Letters to his Friends*, 15.3, 51 BC)

> The barbarians [Sasanian Persians] . . . do not have a paid army as the Romans do, nor do they maintain trained standing armies. Rather, all the available men, and sometimes the women too, mobilize at the king's order. At the end of the war each man returns to his regular occupation, taking as his pay whatever falls to his lot from the general booty. They use the bow and horse in war, as the Romans do, but the barbarians are reared with these from childhood, and live by hunting; they never lay aside their quivers or dismount from their horses, but employ them constantly for war and the chase . . . the barbarian army, once disbanded, was not easily remustered . . . More a mob than a regular army, the soldiers had only those supplies which each man brought for himself when he reported for duty. Moreover, the Persians are reluctant to leave their wives, children, and homeland.
>
> (Herodian, *History of the Empire from the Time of Marcus Aurelius*, 6.5.3–4; 6.7.1)

Modern writers have tended to accept without question the notion that Parthia constituted an active military threat to

Roman power. This was based on partisan Roman texts, and on identification with Rome combined with projection of modern Western 'defence' mentality back onto the Roman empire. However, the historical evidence does not bear it out; on the contrary, Rome was almost always the aggressor in wars in the Middle East (Goldsworthy 1996, 61–2; Kennedy 1996c). In considering the nature of eastern war, and especially Rome's defeats and failure to conquer Parthia, writers compound their 'Romanocentrism' by focusing on what the Romans were doing wrong, and play down the imperfect but usually formidable effectiveness of Parthian defence (e.g. Goldsworthy 1996, 60–7).

The armies of the Parthian empire and of the Sasanian world are nowhere near as well understood as those of the Graeco-Roman world, but enough is now known for a serious academic treatment; however, this remains to be written (Simpson 1997, 242). A general overview may be briefly sketched here (on Iranian military terminology, see the discussion by Widengren 1976, especially 280–5). Much of the reason for our ignorance is that the societies in question largely lacked the traits which give us such an insight into the Roman military, at least in Europe – a large standing army with extensive permanent installations, a tendency to deposit a lot of equipment archaeologically, and the inclination to celebrate itself, corporately or individually, through writing and representations on stone. This is exacerbated by a dearth of surviving Partho-Sasanian historical texts, and further exaggerated by far less extensive archaeological exploration than that lavished on the Roman provinces.

A major problem arising from this shortage of direct evidence is that many modern treatments of Partho-Sasanian armies are written by Westerners, and are largely based on essentially hostile, poorly or partly informed Graeco-Roman sources. The authors of such Classical texts were almost required, according to contemporary ideology, to depict the Iranians as barbarians who therefore could not be as sophisticated as the Romans – a prejudice which Western scholarship has too often inherited. New assessments are more aware of 'Orientalist' bias, of the limited but important evidence available from Iranian and other documentary sources, and of the rich, though as yet largely untapped potential of archaeology.

Partho-Sasanian military organization was very different from that of Rome. Armies of both empires are usually described as broadly 'feudal' in structure (cf. Gabba 1966, 59), lacking any very large state-funded central professional army to compare with that of Rome. The Parthian army was formed for each campaign by the summoning of vassal lords, each with their personal military retinues or levies (Gabba 1966, 57; Kennedy 1996c, 83–4). Military contingents consisted of large numbers of horse archers and a much smaller proportion of fully armoured cavalry armed with bow, lance and sword: cataphracts or *clibanarii* (whatever the distinction may have been between these; it may have been neither well defined nor permanently fixed. On such heavy cavalry, see Coulston 1986; Mielczarek 1993). Infantry were of much less account (Gabba 1966, 58). Soldiers were 'unfree' men (not slaves, more like lesser vassals or serfs of the great vassal lords; Widengren 1976, 295–7). Under the Parthian kings, the most important vassals were largely Iranians, but it seems that others came from a very wide variety of backgrounds; one lord, based in Babylon with a substantial personal retinue of 100 'kin' and 500 horse archers, was a Jew (Josephus, *Ant. J.* 14.13.5). The same basic system was continued under the Sasanians (Inostrancev 1926, 23–4; Widengren 1976, 285).

Such a military system is seen, with some justification, as cheaper than the enormous, complex and ravenous Roman standing army, but it suffered from the drawbacks of slowness of mobilization, and difficulty of maintenance in the field for any length of time; Partho-Sasanian armies are widely held to have been weak in logistical organization, which reduced their ability to project military power very effectively beyond their own frontiers. The system, especially under the Parthians, was also dangerous for the king; a major defeat under the eyes of his principal vassals could destroy his power and his life.

Nevertheless, while the structuring of Partho-Sasanian armies around the institution of royal vassalage seems indisputable, it also appears that Parthian, and especially Sasanian military institutions were more complex and capable than has been allowed. To begin with, the central royal army may well have been more substantial than has been assumed, especially under the Sasanids (Kennedy 1996c, 83–4); later Parthian Kings already retained standing forces of mercenaries (Gabba 1966, 60). The Parthian royal army seems to have consisted mostly of non-Iranians, individuals or groups recruited from defeated enemies, including Romans, serving for pay (Widengren 1976, 287). Further, late Parthian and Sasanian organization included among the nobility a special class of aristocratic cavalry, some of whom were élite 'knights'. Later, at least, these seem to have formed a distinct grouping which provided officers for the army, but would appear as a formation at state parades (Widengren 1976, 287–8). Such men were accompanied by pages, the older of whom were themselves young warriors. Pages of the king seem sometimes to have had a bodyguard function; in late Parthian times they could form a special corps in war (Widengren 1976, 292–3). The Parthian and Sasanian kings had personal guards, while the Sasanians also revived the name of the Immortals of the Achaemenid period, although the nature of this corps in the neo-Persian empire is far from clear (Widengren 1976, 293–5).

Other bodies of troops levied for service from peripheral peoples and polities seem to have had a status more like subordinate allies; it is unclear whether, under Parthian rule, Dura was regarded as an autonomous tributary ally, or whether in wartime it had to provide troops for a nominal, probably absentee, overlord.

As we have seen, western scholars, often seeing the subject from the Roman viewpoint, usually regard the abilities of Partho-Sasanian armies as fairly limited, especially in prosecuting aggressive warfare, although in defence, like the Russians of recent centuries, they often used their particular military talents in combination with a forbidding landscape and climate to destroy invaders from the West (Kennedy 1996c). Further, it has been asserted that 'the Sasanian ability to campaign successfully on simultaneous fronts implies a well-organized commissariat and long-distance communications network in addition to able generalship and effective troops' (Simpson 1997, 242). It may also be necessary to question closely assumptions about the supposed relatively

small scale of direct central action and spending on military affairs; 'the scale of investment in military infrastructure along the frontiers suggests that a, if not the, major role was played by the Sasanian state . . . "Long wall" defences were . . . constructed in many sectors of the Sasanian frontier . . . facing Central Asia' (Simpson 1997, 242–4).

Partho-Sasanian armies also drew on a variety of subordinate states and cities, many of which retained their own military traditions, sometimes including those of the Hellenistic world which had developed siege warfare and the counter-measures of urban defence to fine arts, not least in artillery.

It is widely believed that the Parthians were not good at siege warfare, and that the Sasanians had to learn it from the Romans. The sparse historical texts for the third century (valuably presented by Dodgeon and Lieu 1991) specifically mention the Persians engaging in siege warfare, but give no details of the degree of sophistication involved. By the fourth century, the Persians did make siege walls, e.g. round Nisibis (Theodoret 1.11; Dodgeon and Lieu 1991, 165). The veracity of the presumption of initial Sasanian incompetence in siege warfare, slowly remedied by stealing ideas from Rome, has been rightly questioned; after all, sophisticated urban defences and very complex siege warfare had developed in the Middle East long before the Greeks (Leriche 1993a). At Dura, the central fact of our knowledge of the army which attacked the city in the mid-250s is that they pressed home a determined siege, despite sustained and apparently ferocious resistance – and won. It is clearly demonstrable that they used a variety of sophisticated tactics, including saps and assault mines, ramps and almost certainly machines of some kind (rams, towers or both; Leriche 1993a). There is every reason to think that a substantial artillery train was also employed. The massive Roman preparations to resist such an assault reveals that they had a thorough awareness of, and respect for, this Persian capability, evidently fully developed during, if not before, the earliest phases of Sasanian history. This had already been demonstrated in dramatic fashion some years earlier, with the taking of the north Mesopotamian city-state of Hatra, which had beaten off several Roman sieges. Hatra was clearly a centre of expertise in the practice of urban defence and the use of artillery (Baatz 1978), and had at least nominally been part of the Parthian empire inherited by the Sasanians; there may have been other Sasanian-ruled polities with such capabilities. Although the means of Persian victory at Hatra are unknown in detail, and could have relied on luck or treachery, the Persian policy of deporting and putting to work captured talent (Dodgeon and Lieu 1991, 57: Shapur I, Greek text, lines 34–5) may well have added significantly to a considerable established Sasanian capability in poliorcetics. However acquired, the hard evidence from Dura proves that, as early as the mid-third century, the Sasanian state possessed a fully developed capacity to invest and take a strongly defended city by main force, even one specially reinforced to withstand this type of attack.

The Roman army on the Middle Euphrates, AD 165–250s

As will be seen, Dura was home to large numbers of Roman troops in the early third century AD, and served as regional headquarters for many more. What were the soldiers there for: frontier defence, aggressive action, or surveillance of the conquered? Rome's seizure of the Middle Euphrates valley from Parthia in AD 165 was in no plausible sense defensive, although (almost uniquely) the war had been instigated by the Parthians. It is clear enough that Parthia did not constitute a long-term strategic threat to Rome's presence in the Middle East; as we have seen, the threat, intermittent but repeated, was of Roman aggression against Parthia.

The seizure of Dura and the adjacent regions marked the successful stepping-up of Roman pressure. It also provides evidence for the successful long-term adaptation of the Roman army to local conditions in Syria and Mesopotamia during the early empire, seen in the success of the campaigns of Trajan, Lucius Verus and Severus. This increasing superiority was due to a combination of experience, local recruitment and the adaptation of equipment, troop types and tactics (Kennedy 1996c, 87–9). Roman success culminated in the pyrrhic victory of the collapse of Parthia, and its replacement by the much more formidable Sasanid Persian dynasty, which quickly threw Rome onto the defensive. It was during the decades of struggle and frequent defeat in the East that Dura was destroyed.

The composition of the Roman garrison at Dura-Europos, AD 165–c. 250

Much is known about the history of the Roman military presence at the city from documentary material. As will be seen, the military equipment itself is not of direct help here, due to lack of inscriptions on any of the pieces, and because in the middle imperial period the equation of equipment types with categories of unit is fraught with difficulties of its own. However, considerable quantities of relevant epigraphic material were discovered in the city and, most unusually, many military papyri came to light. The latter have been fully published (Welles *et al*. 1959), although unfortunately the final report on the inscriptions is yet to be written. However, the texts were provisionally published in the *Preliminary Reports*. The evidence for the composition of the garrison which these sources provide has been discussed elsewhere (Rostovtzeff 1938; Welles 1951; Welles *et al*. 1959; Dabrowa 1981; Kennedy 1994). The names are known of various units and contingents which were resident, based nearby or transitory. Extensive information has been recovered regarding the structure and routine of one unit in particular, *cohors XX Palmyrenorum*.

Dura was a Roman garrison town for about ninety years. Dabrowa (1981, 63–4) has proposed two distinct phases in the history of the garrison, the first (AD 165–208/9) consisting of a modest auxiliary presence only, the second (no later than 208/9 to the mid-250s) far more substantial, with a separate military quarter, and the *auxilia* supplemented by a regular presence of vexillations from the legions of Syria Coele. The presence of personnel of *legio IIII Scythica* is particularly well attested (Speidel 1998, 172). From the annexation of the city in AD 165 to the 180s or beyond, the military presence probably consisted mostly of a body of Palmyrene archers (*Rep*. VII/VIII, 279, no. 909; Millar 1993, 115). In 168/9 and 170/1 they are attested under an 'officer', *strategos* (*Rep*. VII/VIII, 83–4, nos 845–6). These do not appear to have been part of the regular army, but seem to have been *symmachiarii* (Palmyra being an

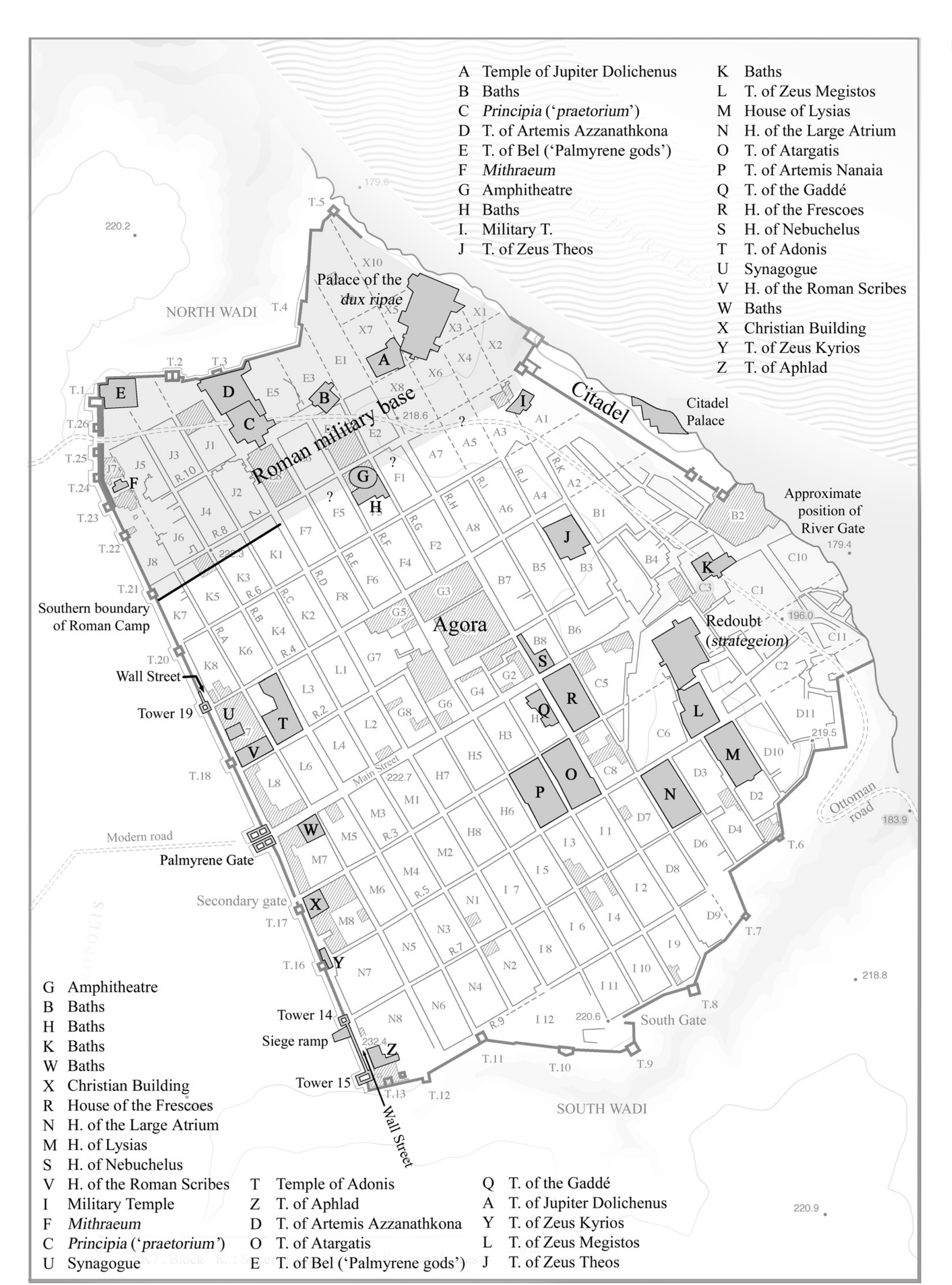


Figure 4 A plan of Dura showing principal features and locations (adapted from Leriche and Gelin 1997, viii).

allied state). They are not mentioned later and it is possible that they eventually formed the nucleus of the later *cohors XX Palmyrenorum* (Welles *et al*. 1959, 24, 26–7). The raising of this unit represents, at least in part, a Palmyrene tradition of foreign military service with a long pedigree, especially at Dura itself. During the early years of the Roman occupation, the Palmyrene archers may have been brigaded with all, or perhaps part, of *cohors II Ulpia equitata civium Romanorum sagittariorum*; certainly at some stage both were commanded by a centurion of *legio IIII Scythica* acting as *praepositus numerorum* (Speidel 1998, 172). It is possible that a small detachment of *IIII Scythica* was also already based in the town.

The expansion of the garrison may have begun a good deal earlier than the end of Severus' reign. Speidel has argued that the Dura garrison was an elite force, and was already so in 198. He contends that the only effective troops Severus had at the siege of Hatra, the '*Europaioi*', were not, as usually translated, 'European' but from [Dura-]Europos (1984, esp. 307–9; Dio 75.12.4–5). The point turns on the reading of an inscription from Dura, and especially on the interpretation of Cassius Dio, and his theory has been attacked by Kennedy (1986). Even if the identification with Dura is correct, it may well be that the notion of the *corps d'élite* is largely anachronistic when applied in the Roman world, at least at this period; even special units like the Praetorian Guard were more in the nature of political troops than a fighting elite. Whether the formations at Dura really formed an unusually effective combat force remains obscure.

Certainly, major enhancements to the garrison's facilities were made during the last years of Severus and the reign of Caracalla. A number of the city's temples were taken over by the military. It is clear that the entire northern quarter of the city

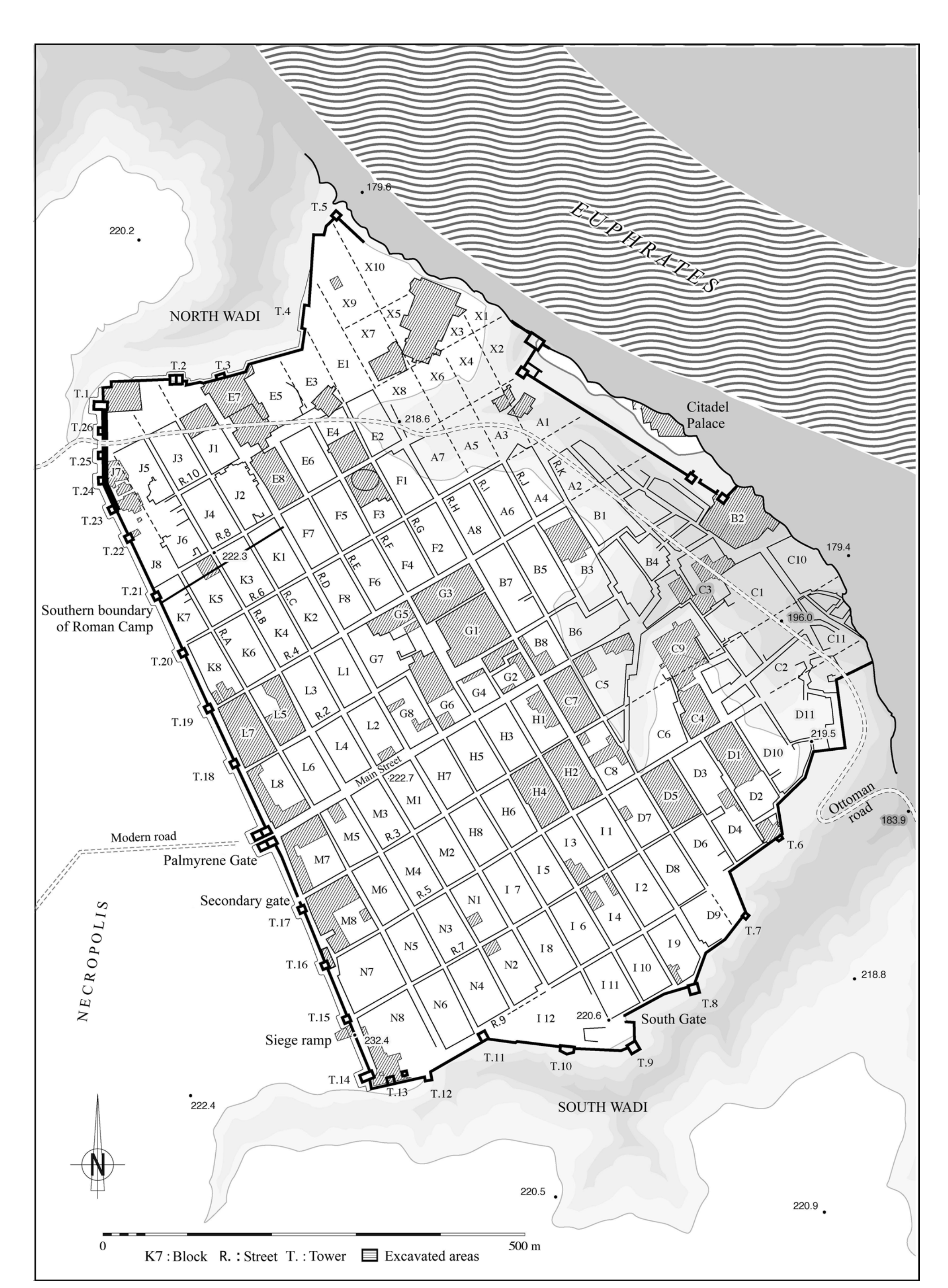


Figure 5 Plan of Dura-Europos showing main topographic features and locations of blocks, streets and towers (adopted from Leriche and Gelin 1997, viii).

was commandeered as a military base and divided off, in part at least by a defining wall, from the rest of the town (Fig. 4, 5; *Rep*. IX.iii, 69). Within this cantonment blocks of private houses were turned into barracks or demolished to make way for military buildings such as the *principia* (the so-called *praetorium*), an amphitheatre, baths and the palace of the *dux ripae* (p. 20; Fig. 6; see Rostovtzeff 1938, 24–5 and note 14; Welles 1951, 257–8; Dabrowa 1981; Millar 1993, 132; Pollard 2000, especially 58). Much of this building programme is now thought to date to AD 211 (M. Gelin, pers. comm.).

How big was the third-century garrison? The small amphitheatre appears to have been unable to hold more than about a thousand men, but it was a somewhat ramshackle affair made out of a single insula to avoid impinging on the pre-existing street grid, so its spatial constraints mean that it cannot serve as a reliable guide to the size of the garrison (*Rep*. VI, 76). It is clear that the soldiers overflowed the military quarter. As would be expected, soldiers were stationed in the towers along the walls and in the gates. Graffiti from the Palmyrene Gate mention soldiers detached on police duties (*beneficiarii*: *Rep*. I, 20–1, 42 no. 1, 32–41, R1–3, R6, R14, C8; *statores*: *Rep*. I, 36–8, R8a, R19, R11, R14). It seems that troops were also routinely billeted in some private houses (*Rep*. V, 39–40 no. 401, *Rep*. VI, 176–8, 265–308; Welles 1951, 259–60; Dabrowa 1981, 65–6), and it may be assumed that on occasion substantial bodies of troops passed through the city in transit.

In terms of specific units, elements of the two legions of Syria Coele, *IIII Scythica* and *XVI Flavia Firma*, are mentioned at Dura over an extended period (on *IIII Scythica*, see Speidel 1998). Legionaries from these units built the middle *mithraeum* in 209–11 (*Rep*. VII/VIII, 85–6 no. 847). *Legio XVI Flavia Firma* is last mentioned at Dura under Gordian (*P. Dura* 43). Part of *IIII Scythica* was stationed at Dura in 254, shortly before the final

siege (*P. Dura* 32 refers to 'the local [*sic*] vexillation of *legio IIII Scythica [Valeriana] Galliena*': Welles *et al*. 1959).

In the early empire vexillations were generally temporary campaign formations, although semi-permanent garrison vexillations appear in Africa as early as the reign of Hadrian (Saxer 1967, 127). The advances of the eastern frontiers under Verus and Severus left the bases of the legions of Syria Coele at an inconvenient distance from the frontiers. Whether the legions of Syria Coele kept their bases at Zeugma and Samosata into the mid-third century as convenient loci for logistics and communications, is unclear (Millar 1993, 130). Coins bearing the capricorn badge of *IIII Scythica* continued to be minted at Zeugma until AD 249, suggesting it was retained as a base and perhaps remained the nominal headquarters of the legion (Speidel 1998, 173, 175). This situation apparently led to increasing outposting of detachments closer to the actual frontiers (Speidel 1998, 173). The legionary elements deployed to Dura may therefore have been there on a long-term, standing basis (Speidel 1998, 172). Certainly vexillations thrown forward to Dura would have been relatively easy to supply from Zeugma and Samosata, straight down the Euphrates.

It is impossible to say exactly how many legionaries were based at Dura at any given time on the basis of our patchy evidence. The size of a vexillation was highly variable: figures of 1,000 or 2,000 men are attested in this general period (Saxer 1967, 119; Holder 1982, 40). Presumably such figures represent whole cohorts, two and four respectively. Although figures as low as 300 men have been suggested for the detachment of *IIII Scythica* at Dura (Speidel 1998, 172–3: the basis of this figure is not specified), it seems unlikely that any legionary vexillation at Dura would consist of less than cohort strength, and it is barely credible that there could have been more than two cohorts from each legion. This gives us a plausible range of 500 to 2,000 legionaries at Dura. The document of 254, mentioning the 'local vexillation' of the *IIII Scythica*, may imply that they were more or less permanently detached (*P. Dura* 32; this process foreshadows the gradual fragmentation of legions over the following century).

Legions other than those of Syria also left inscriptions at Dura at this period. These included elements of *III Cyrenaica* (*Rep*. IV, 68–71 no. 168), and possibly *X Fretensis* (Welles *et al*. 1959, 25). However, these units are not attested at the site later, so it is thought that they were temporarily stationed at Dura in connection with Caracalla's Eastern operations.

The best known unit at Dura, which we may be sure was permanently based there as it is mentioned in inscriptions several times from 208 onwards and part of its archives were found in the city, was *cohors XX Palmyrenorum* (Welles *et al*. 1959, 26–8 etc.; Kennedy 1983, 1994). This unit, possibly raised as early as 165 (Kennedy 1983, 216), was a milliary *cohors equitata* of unusually large size according to its records. Its strength approached or exceeded a thousand men, at least at times (*P. Dura* 82 and 89; *P. Dura* 100, as reconstructed by Welles, may represent a strength of about 1200 men). It may have been styled *sagittariorum* (although this is doubtful: Welles *et al*. 1959, 26 n. 1). The unit certainly included a small number of *dromedarii*. Such troops do not seem to have been especially useful in pitched battle, but were retained as a minor element in an unknown number of Eastern auxiliary units, presumably for specialist tasks within the steppe/desert zone, such as scouting, supply convoy escort and police tasks (Dabrowa 1991, 365–6). Their equipment is unknown, but Dabrowa has speculated plausibly that it would have been derived from that of Palmyrene camel-troops from whom many, probably most, such soldiers were drawn (Dabrowa 1991, 365).

Whatever the true identity of Severus' '*Europaioi*' at Hatra (see above), it appears that Dura's *cohors XX Palmyrenorum* was indeed an unusual unit, both in terms of its size and in its exceptional pattern of recruitment. At least from 219 to 222, the period covered by surviving records, all recruits and transfers to the regiment first served as *singulares* of the provincial governor, where they presumably underwent particularly exacting training before being posted to Dura (Speidel 1984, 308). Nevertheless, its apparent importance as a part of the garrison may have been overestimated as a result of its largely fortuitous and disproportionately strong representation among the written records. It seems that Dura's *principia* (the so-called *praetorium*) was reserved for the legionaries (*Rep*. V, 216, 219). The headquarters of *XX Palmyrenorum* was apparently relegated to the requisitioned Temple of Azzanathkona (*Rep*. V, 216, 219).

The latest reference to *XX Palmyrenorum* is a list of men and mounts. One of the men lost his horse on a date equivalent to 31 August AD 251, so the document may be placed soon after (*P. Dura* 97). It is generally assumed that this unit was still in residence a few years later at the time of the siege, during which it was presumably destroyed (e.g. Welles *et al*. 1959, 27), although there are now strong grounds for doubting this (pp. 22–5).

It is possible that *cohors II Ulpia equitata* was also in garrison in the early decades of the third century, but dated references to it are absent after AD 194. This is before *XX Palmyrenorum* appears in the records, so it may well be that the latter replaced *II Ulpia*, taking over the temple headquarters (*Rep*. V, 229).

Other units mentioned at Dura do not seem to have been part of the garrison, but were probably stationed nearby (*cohors III Augusta Thracum* mentioned in 227, *P. Dura* 19; see *Rep*. VII/VIII, 433–41; *cohors XII Palaestinorum* in 232, *P. Dura* 15; see *Rep*. VI, 433–5).

In summary, a very substantial force of legionaries and auxiliaries was based at Dura in the third century, which may be estimated at 3,000 to 5,000 men. This broad estimate is supported by a consideration of the size of the military encampment at Dura, which is approximately 10 hectares, about half the size of a legionary base. Clearly this is the crudest of guides, as the camp was full of converted civilian buildings and so may have housed densities of troops very different from those of purpose-built military bases; however, when one also considers other accommodation such as the wall towers, the citadel and the fact that 'private' houses were also used for billets, it is clear that thousands, rather than hundreds, of troops, were based at Dura.

On the other hand, it is also clear that at times, and probably routinely, elements of *XX Palmyrenorum* were posted elsewhere, for example at a location called Becchufrein (*P. Dura* 100 and 101; Fink 1971, 15). This has been plausibly identified with the recently excavated fortress downstream at the modern site of Kifrin, Iraq, which seems to have been a small town also home to a permanent Roman garrison (Fig. 3; Invernizzi 1986a,

1986b, 1989; Valtz 1987). Its excavator argues that Becchufrein was probably established around AD 194 as a consequence of Severus' first Eastern campaign, the division of Syria into the two provinces of Coele and Phoenice, and a simultaneous advance of Roman territorial control on the Middle Euphrates (Invernizzi 1986b). The station was destroyed in the 230s or 240s.

Indeed there were auxiliary units and small detachments including elements of the province's two legions strung right along the Euphrates. The excavations at Dura have yielded a letter about a Parthian envoy from Marius Maximus, legate of Syria, to tribunes, prefects, and *praepositi* of *numeri* which ends by listing five stations along the river, from north to south: Gazica (near the confluence of the Chabour), Appadana, Dura, Eddana and Biblada (*P. Dura* 60B, AD 207–8). Appadana often appears as an outpost in the Dura texts (Millar 1993, 131). The papyrus, dated AD 232, referring to Aurelius Corbulo, river pilot of *legio XVI, Flavia Firma*, apparently active near Appadana, hints at the numbers and movements of soldiers along the river valley (Feissel and Gascou 1989, 540, 559, no. 11).

It is possible, perhaps likely, that such outposting was usual for substantial elements of all the formations, legionary and auxiliary, which maintained their headquarters at Dura, although in the absence of records for the legionary vexillation(s) matching those of *cohors XX Palmyrenorum*, we lack data. However, it seems increasingly clear that a wide range of secondments, from individual soldiers on errands lasting a day or two, to substantial drafts manning secondary garrisons and posts on rotation or a semi-permanent basis, may have been the norm for all Roman armies in peacetime. It may be that, except in wartime, the concentration of more than half a unit in one place only occurred for short periods, for example in the spring for post-winter training. Perhaps it is best to imagine that normally troops from any one unit were quite widely scattered, moving between a host of postings and duties, many on a seasonal cycle.

Reasons for dispersal and outposting in Roman Parapotamia at this time probably included countering a spectrum of small-scale threats from cross-border raiding – perhaps officially-sponsored Persian irritants – to suppression of local resistance to Roman rule and standard police-work. Dispersal was also convenient, even necessary, for logistical reasons, to spread the burden of supplying the troops (Pollard 1996, 215).

Under such circumstances, it may be seen that trying to estimate the numbers of the garrison *resident* at Dura is meaningless; while the numbers commanded from and nominally based at the city may have been quite stable, it is likely that the actual numbers resident in town fluctuated quite strongly from season to season according to routine, and from year to year according to the patterns of peace and war. Reference to *cohors XX Palmyrenorum* as in *hiberna*, 'winter quarters' (*P. Dura* 89, i, 5), reflects that Dura was seen as an administrative and probably logistical base for a group of units with wide geographical deployment and responsibility, and was not primarily intended to be a garrisoned defensive fortress. The scale of the additional emergency anti-siege defences thrown up in the 250s is a sign of things going wrong, with the Romans no longer able to control the military situation in their own way – an admission of loss of initiative, and that the previous city defences were inadequate to withstand a siege, as none had been thought likely. Dura did not live as a defensive stronghold during the third century, but died as one, apparently held with grim determination to slow down a Persian invasion.

Through most of the Roman occupation, then, Dura appears to have been the base for a 'mixed brigade' of legionary and auxiliary elements, a major node within a complex and shifting pattern of outposts in this frontier zone facing Parthia-Persia. It seems that this kind of arrangement was actually widely practised in the middle empire. The Dura 'mixed brigade' was paralleled in Dacia, at Porolissima, base to a force composed of legionary vexillations and auxiliary formations including, coincidentally, a Palmyrene horse archer unit (Gudea 1989, 34–45). A similar deployment may have been made in Armenia: an inscription (*ILS* 9117) records vexillations of both Cappadocian legions under the tribune of a milliary cohort in garrison, in 175, at Kainepolis (Edschmiadzin). At least one vexillation was still there in 184–5 (*ILS* 394).

The dux ripae

It seems clear that by the 240s the large force based at Dura garrison had become the core of an extraordinary new standing command, that of the *dux ripae* (Gilliam 1941, 158, 174). Millar has pointed out that the evidence for the title of *dux ripae* depends on its occurrence in one of two *dipinti* commemorating slaves of Domitius Pompeianus, one of the known holders of the ducate, on the wall of the building identified as his 'palace' (Fig. 6). He does accept it is evidence for the early use of *dux* as a technical military title, but rightly cautions that 'until there is clearer evidence, too much effort should not be devoted to constructing a picture of his regional military responsibilities . . .' (Millar 1993, 133). Nevertheless, it is reasonable to suggest that this equestrian post (Gilliam 1941, 168), which foreshadows the territorial ducates of the fourth century, seems to have been a local command over the forces of the frontier region of Syria Coele facing Persian Mesopotamia/ Babylonia. Specifically, he probably controlled those deployed along the river corridor, a likely main axis of invasion in either direction. The post was unusual in apparently involving responsibility both for the land and the river (Isaac 1995). However, it differed from the later commands in that it was apparently confined to a single province (there is no indication that the *dux* had authority over troops in the Roman province of Mesopotamia), and that the *dux* was subordinate to the provincial governor (Gilliam 1941, 165, 169–70). Such new, extraordinary commands may have been more common than we have thought; the Dura ducate is reminiscent of the transprovincial military command, covering at least Pannonia Inferior and Moesia Superior, established by Philip in 248. Based at Sirmium, which was, like Dura, neither a governor's residence nor a legionary base, the command was also separate from the provincial governorships (Mócsy 1974, 204). It is likely that the Durene command was established because the provincial and legionary legates were based so far to the rear; it ensured that, with incursions likely at any time, there was a unified local command structure allowing quick response rather than necessitating constant referrals to Antioch or the Euphrates legionary bases with their attendant delays.

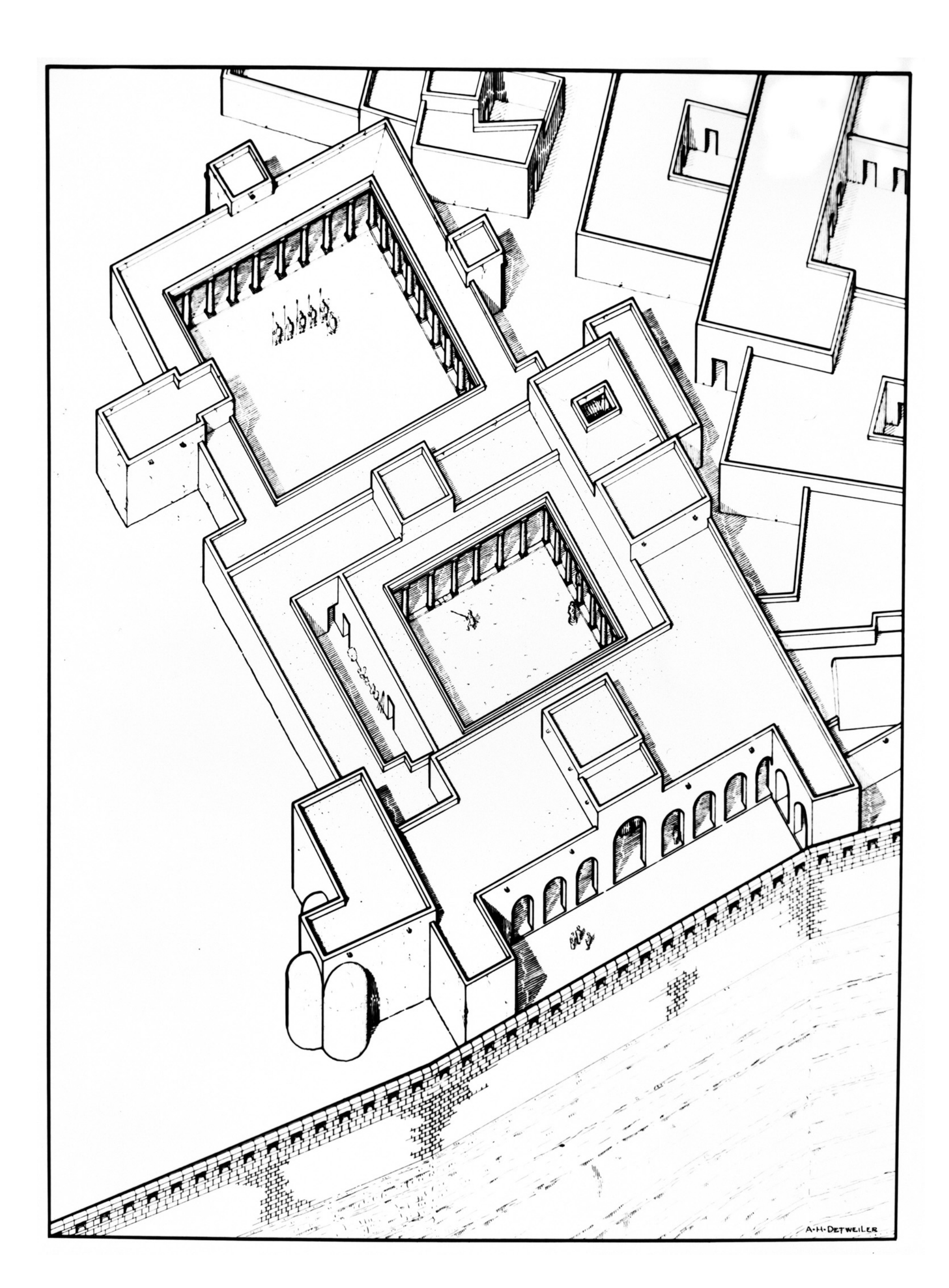


Figure 6 A reconstruction of the 'Palace of the *Dux Ripae*.' This building now appears to have been constructed some decades before the office of *dux* was created (pp. 18, 20).

The garrison at the time of the siege: previous views

In the past there sometimes seems to have been an implicit assumption that the garrison which was caught in the siege and destruction of the city was essentially the same as the 'peacetime' complement of the preceding decades, discussed above (e.g. Welles *et al*. 1959, 27 on *cohors XX Palmyrenorum*). However, there are strong grounds for challenging this supposition.

The siege itself was a single episode in the series of wars which raged on the frontier during the mid-third century. Dura was part of a much wider military picture, in which Persian invasion and Roman counter-attacks threatened repeatedly. Under these circumstances, rapid and frequent redeployments of units are to be expected, as the Roman command attempted to forestall or respond to military action by the Sasanians. It is very probable that the garrison of such an important strategic centre as Dura was affected by this, with various elements arriving or being withdrawn, perhaps at frequent intervals.

Late changes in the garrison have been suggested before. In AD 251 an altar inscription records the arrival of vexillations of *cohors II Paphlagonum* and *cohors II Ulpia equitata*, the latter evidently now based elsewhere (Welles *et al*. 1959, 25–6). This indicates that reinforcements may have been transferred to Dura, but how many and for how long is unknown.

Furthermore, the dated papyrological and epigraphic evidence stops short of the date of the siege. The latest mention of legionaries is in AD 254 (*P. Dura* 32) while *cohors XX Palmyrenorum* is not attested after late 251 (*P. Dura* 97). Any changes in the garrison in, say, 254 or 255 have left no trace.

At a more immediate level, there is the likelihood of tactical redeployments as the Persians approached the city (it is unlikely the attackers took the city by surprise), involving calling in outposts and strengthening arms such as mural artillery crews. The cavalry would have been vital to monitor the Persians' approach, but would have been a liability if shut up in the town during the siege. It may be that all or most mounted elements

were withdrawn upstream when an attack on the town appeared imminent. (The presence of horse armour in Tower 19, and other items of equestrian harness in the city, is no objection; it has been argued that the horse armours, or armoured trappers, were unserviceable at the time and awaiting repair, and other harness may have been left behind.)

Do the weapons and equipment provide any direct help in determining the composition of the siege garrison? It is fairly common for items of copper alloy equipment found on European sites to bear punched or scratched identification labels giving details of the owner's name, and perhaps his rank, post, century or *turma*, and unit (MacMullen 1960). Examples occur on helmets and shield bosses (e.g. the *umbo* of Junius Dubitatus of *legio VIII Augusta* from the Tyne at South Shields, or that of Verus the *capsarius* from Mainz). Inscribed copper alloy studs and *tabulae ansatae* from other equipment are also occasionally found (Oldenstein 1976, 190–3, nos 741, 744, 755–79, pls 59–61). Leather shield covers are also known to bear labels (e.g. from Valkenburg: Groenman-Van Waateringe 1967, 56–7, no. 6, fig. 10). Unfortunately, no such identifying inscriptions have been found at Dura so far, with the possible exception of an unprovenanced piece of leather, perhaps an equipment label, with an inscription reading *T Zibida Iul I* [. . .] (*P. Dura* 131). 'It appears to have come from some leather equipment on which were inscribed the troop and name of the cavalryman to whom it belonged. The turma Zebida is known between AD 219 and 225 . . . and a Julius Julianus belonged to it, who had enlisted in 207 . . .' (Welles *et al*. 1959, 405). In any case, it is not actually associated with any item of equipment.

This lack of inscriptions is not necessarily significant, in that only a handful of objects might reasonably be expected to bear them, i.e. the copper alloy *umbones*, but only two or three of these are sufficiently well preserved for any inscription to be visible. There were no complete copper alloy helmets. A fragmentary inscription was seen on the semicylindrical shield **629** at the time of its excavation, but it was indecipherable and is now invisible (*Rep*. VI, 466).

The types of weapons deposited at Dura prove to be no simple or trustworthy guide even to the kinds of troops present. Widespread use of bows, for example, does not prove the presence of auxiliary *sagittarii*, for at least some legionaries were trained in archery (for the tomb of a legionary archer at Apamea, see Balty 1988, 101). In any case, in a siege anyone capable of shooting may well have been pressed into service. Conversely, the use of artillery need not automatically imply the presence of legionaries (such as the legionary artilleryman buried at Apamea: Balty 1988, 101). Baatz has argued that auxiliaries did not operate artillery, but this seems to be based on absence of evidence, and is largely derived from what is known of the West in the first and second centuries AD (Baatz 1966). The distinction may not have applied in the very different tactical situation at Dura in the third century, at a time when legionaries and auxiliaries had long since converged in so many ways.

The presence of several semicylindrical shields (**629** to **631**, ?**632**) is also actually more of a puzzle than a guide. While these are traditionally considered an indicator of the presence of legionaries, all the representations of such troops from the early third century show them with oval shields (Fig. 25: see Coulston 1983, pls 1–3). This change was under way in the mid-second century, as the Column of Marcus Aurelius shows; semicylindrical shields appear in few scenes (Caprino 1955 *et al*., figs 68, 98, 102, 116 and 121). The retention of semicylindrical shields at Dura a century later is curious. Perhaps this type survived in the East because it was especially useful, as a defence against arrows for example. We cannot ignore the other possibility that some were simply retained as parade pieces, as splendid and as functionless as the bearskins of the British army's Brigade of Guards today. The Praetorian Guard apparently retained archaic ceremonial armour well into the imperial period; on the Cancellaria reliefs they are shown carrying republican oval *scuta* (Bishop and Coulston 1993, fig. 2).

Evidently, the arms themselves can be very misleading at Dura. By the third century, the equipment of auxiliaries and legionaries had converged, with longsword, round shield, spear and mail or scale armour common to both. This was part of a more general trend of convergence as, in the third century, auxiliaries were largely Roman citizens. Well before the siege of Dura, it became difficult to distinguish legionaries from auxiliaries by their equipment. Indeed, it now appears that the distinction between the two was never as hard and fast as many modern interpreters have assumed, largely on the basis of Trajan's Column (Maxfield 1986; Coulston 1989).

To summarize, neither the epigraphy, papyrology nor the arms themselves give reliable information on the constituents of the garrison during the siege, i.e. the men to whom much, and probably most, of the equipment belonged. There is an unbridged gulf of several war-torn years between the closing date of the available documentary evidence on the one hand, and the deposition of most of the armour on the other. It is not possible to identify unit types, let alone name the contingents. The significance of this gulf is emphasized when the historical background to the siege is examined in detail, and its implications are explored.

The date and historical context of the siege

The evidence for the exact date of the siege is complex. The archaeological evidence from the site, relevant primary documentary sources for the period, and modern research on the historical context of the siege are discussed in detail elsewhere (James 1985, MacDonald 1986). The destruction of the city is mentioned in no Greco-Roman source. Its dating is derived from archaeological evidence, especially coins, recovered at the site. In my view, the evidence currently available does not permit the siege to be fixed to a particular year; it seems to have probably occurred in AD 255 or 256, possibly in early 257, with late 254 just feasible but unlikely (James 1985, 120–2). Using the same evidence, MacDonald regards 257 as the most likely date (1986, 63–4). However, this depends on numismatic arguments, namely how one assesses the date of the third and fourth issues of radiates of Valerian from Antioch, which float between the dated second issue of 254 and the fifth issue of 257. The latter does not appear at Dura. MacDonald assumes yearly issues, so the fourth issue, which is attested at Dura, would have been minted in 256. Allowing for some delay in the coins entering circulation at Dura, he concludes that the siege took place in 257. However, one may dispute the extent to which such delayed circulation occurred, and in any case it is not a very safe assumption that the fourth issue appeared in 256; it could have appeared at any

stage between 254 and 257 (James 1985, 121–2). For narrative historical purposes at least, where accuracy to a particular year is significant, it remains much safer to assign a fairly broad time-bracket for the fall of the city, say 255–7 (James 1985, 121).

It seems beyond question that, while no Greek or Latin text records it, the capture of Dura by the Sasanians is mentioned in Shapur's inscription on the Kaabah of Zoroaster at Naqsh-i Rustam (a document hereafter referred to as *KZ*: Sprengling 1940, 1953). It was apparently listed as one of the towns taken in Shapur's second war with Rome, which consisted of a major invasion of Syria, the alleged destruction of a Roman army at Barballissus and the capture of Antioch and thirty other cities. The Battle of Barballissus is not mentioned in any Western source, and the date of the second war is disputed. The best, but by no means certain interpretation, is that of Baldus (1971) which is generally followed here. According to his view, the invasion took place in AD 253, while there was no emperor in Syria. The Roman provincial garrison was caught unsupported at Barballissus and smashed. Antioch fell in this onslaught, which became a major looting expedition as Shapur ransacked cities and withdrew before Rome could react.

The date of 253 certainly conflicts with the archaeological evidence from Dura, which cannot have been destroyed so early. In fact, Rostovtzeff (1943), Sprengling (1953) and Baldus (1971) have made a good case for the destruction of Dura occurring separately from and subsequent to the main, successful invasion. The reference to Dura appears in a short list of cities appended to the account of the second war on *KZ*, a roster which according to current thinking represents an abortive follow-up campaign after the main invasion (Baldus 1971). The Dura numismatic evidence would then suggest that this second attack took place in 255, 256 or 257. Valerian was in Syria by 18 January 255 (Pekáry 1962, 124; Grenet 1988, 141; Millar 1993, 163, etc.), but may have arrived as early as autumn 253 (Balty 1987, 238–9; 1988, 103). In 257 he was issuing coins proclaiming victory over the 'Parthians' (Carson 1968, 133). This evidence seems to fit neatly together to produce a picture of a major successful Persian incursion around 253, and a second attempt to reinvade Syria around the mid-250s which involved the siege and destruction of Dura and an advance further up the Euphrates road to take Circesium. However, the list stops there, the second invasion apparently abandoned. Was the determined defence of Dura perhaps a calculated sacrifice, hindering the Persian advance – it would have been very dangerous for the invaders to leave it behind, unreduced – thus buying Valerian time to counter-attack? If so, the loss of the city may have been seen as a necessary price for aborting a second serious Persian invasion of Syria.

Discontinuity: a Persian occupation in AD 252–3?

If Dura would have been too dangerous to bypass in 255–7, the same would also have been true during the earlier Persian invasion of around 253, although Baldus believed that on the first occasion Shapur did exactly that, in the manner of *Blitzkrieg*. Rostovtzeff proposed that the garrison was withdrawn in the face of the Sasanians, who peacefully occupied the town; there is certainly no evidence for an assault before the final siege (1943, 51). Elsewhere I have reviewed the evidence he adduced to support his conclusion (James 1985; by an uncanny coincidence, after forty years of general neglect, another scholar chose to attack Rostovtzeff on the same grounds almost simultaneously, with very similar results: MacDonald 1986). The archaeological evidence presented by Rostovtzeff was entirely spurious. However, the evidence of Parthian and Middle Persian texts from Dura provides the key.

At the time I published my own contribution, the readings of these potentially crucial pre-siege texts, not least *dipinti* on the synagogue murals, seemed in a hopeless state of confusion, with epigraphers at loggerheads over their meanings. I concluded that until there was some measure of agreement about the readings, the evidence was simply unusable (James 1985, 115–16). This situation was changed by a subsequent study which encompasses new readings of the synagogue texts and a reappraisal of the other Parthian and Pahlevi texts from the site (Grenet 1988). Grenet's fresh readings of the synagogue texts now seem to make a very solid case for a relatively brief occupation of Dura by the Persians before the preparations for the final siege: the *dipinti* appear to have been written by occupying soldiers or officials, and some are dated to 253. There is also a small group of papyrus documents (one in Parthian, two in Pahlevi) which have been overlooked by all recent writers (myself included). As newly read by Grenet, one of the papyri is a letter addressed to a commander, another a transport order sent by Shapur himself (*P. Dura* 153 and 154; Grenet 1988, 136–7). Crucially, Grenet claims that the document mentioning Shapur and military transport was found *under* the rampart which was built before the final siege (pp. 30–31; Grenet 1988, 138–9 and n. 39); however, it should be noted that I can find no conclusive evidence that the letter was indeed found under the rampart. The original notice of discovery of the document does not mention the circumstances (*Rep*. VI, 419 no. 7, as *D.Pg*. 37 = *P. Dura* 154); the *Final Report* states only that it was found 'in Wall Street behind Blocks L7 and L8' (Welles *et al*. 1959, 415). Its survival suggests that it must have been deeply buried, and so it is a reasonable hypothesis that it predates construction of the rampart; however, this is not conclusive proof.

If we accept that *P. Dura* 154 was indeed found beneath the rampart, it is certainly most simply explained by a Persian occupation which Grenet, using this and much supplementary evidence, places in 253, probably lasting through the winter into 254. He concludes that Shapur installed a satrap and a garrison in the town, intending to hold it permanently, but was eventually compelled to withdraw allowing the Romans to reoccupy the city and strengthen the defences (Grenet 1988, 143–6).

Balty has proposed a different chronology. The dated synagogue *dipinti* run from 26 March to 6 October 253, with one outlier, dated 4 February, but without a specified year. Grenet suggests that it is 254, and that the Persians wintered at Dura in 253/4. Balty proposes that it was actually 4 February 253, and that the Persians had arrived in 252, the year in which, on other evidence, he would place Shapur's invasion (Balty 1987, 238; for an introduction to the relevant literary sources, see Dodgeon and Lieu 1991).

On the basis of a remarkable group of Roman military tombstones recently found at Apamea (Balty 1987, 1988; Balty and Van Rengen 1993), Millar also wants to redate the Persian invasion to 252 instead of 253. He assumes that the soldiers commemorated died while in the East as part of an

expeditionary force responding to Shapur's initial invasion. Ten of the soldiers concerned were buried in 252 (Millar 1993, 159). Some were from units which had come from as far as Pannonia, including a trooper of *ala I Flavia Augusta Britannica* and a *signifer* of *ala I Ulpia contariorum* who died in April 252 (Balty 1987, 229–31; 1988, 102–3; Millar 1993, 159). But if these units had arrived in Syria by April 252 in *response* to Shapur, then surely he must have attacked in 251! This appears impossible, so these units were probably already in Syria for some other reason, and tell us nothing about the chronology of Shapur's campaigns.

Despite these conflicting arguments of detail, we can with confidence assert the following. Dura was still in Roman hands in the late summer of 251 (*Rep*. IX.iii, 110ff; Balty 1987, 237), but it now seems almost certain that the Persians occupied the city for many months in 253 and probably the winter of 252/3 or that of 253/4, or conceivably both, before the Romans forced them to withdraw by means unknown. Dura was back under Roman control in 254 to judge from a divorce document which dates from the day before the Kalends of May, Seleucid year 565 (*P. Dura* 32; Millar 1993, 162).

It therefore follows that there is a complete discontinuity (in the form of Roman evacuation and Persian occupation) between the great bulk of the epigraphic evidence for the Roman garrison at Dura, and the deposition of most of the arms and armour during the final siege. This obviously has important consequences for interpreting the artefacts discussed here.

Who were the besieged in 255–6?

Even if Grenet's arguments are rejected, and it is assumed that Dura remained in continuous Roman occupation, there are still strong reasons to suspect that the city's garrison underwent substantial subsequent change. If the Battle of Barballissus was fought around 253, that year still marked a colossal disruption of the Syrian army which is likely to have affected the Dura garrison profoundly. Many units may have been wiped out, captured or scattered and it is surely likely that Dura-based troops, assembled as part of the field army, would have been among them. Even if not directly involved in the battle, the garrison at Dura would surely have been affected by its aftermath, as the Roman command strove to repair the defences of the province. This would be the sort of situation where far-reaching redeployments of troops would occur. Certainly, Syrian legionaries were back at Dura in 254 as we have seen, but what of other units?

Of particular interest is the fate of *cohors XX Palmyrenorum*, which is not attested after 251. This could, of course, simply be a lacuna in the very fragmentary documentary record. However, the deposition of part of the records of the unit suggests something else. These were buried beneath the earth rampart, in the Temple of Azzanathkona (Welles *et al*. 1959, 36). More accurately, they seem to have been thrown in as the rampart was started. They certainly were not hidden with intent to recover; they were not in a container, but seem to have been scattered under tons of earth. Their burial at this time has been taken as evidence for the return of the unit to Dura and its presence at the time of the siege (Welles *et al*. 1959, 27), which seems to me to be a glaring *non sequitur*. It is more likely that they were just rubbish lying around from the time of the now-presumed Roman evacuation; it has been noticed that they were mostly old papers and some types of documents were absent (Welles *et al*. 1959, 36). Perhaps the retreating Romans or the incoming Persians had already removed those containing useful intelligence and the remainder were discarded by the returning Romans because *cohors XX Palmyrenorum* was now elsewhere, or no longer existed.

The mid-250s were a time of sudden change and upheaval so complex for Syria and its army that Dura's fragmentary textual evidence clearly does not fully document the many troop movements which affected the city, especially in its last few years. The papyrological and epigraphic data cannot help us to identify the units to which the arms deposited in the final siege belonged, and the arms themselves are highly ambiguous.

To summarize, consideration of the documentary evidence for the history of Dura and of Syria in general in the 250s reveals a picture of complex warfare, invasion, disruption and the apparent destruction of substantial parts of the provincial army. It has been argued that there seems to be evidence of a Persian presence in the city in 252–3, which would mean a complete discontinuity of the garrison; and even if this interpretation is rejected, the sheer scale of military operations, losses and troop movements make it highly likely that the garrison which faced the final siege was of a composition different from that which features in the documentary sources pertaining to the preceding decades.

Wars and troop movements: a new Roman garrison?

We shall never know the detailed history of the deployment and fate of the many Roman regiments caught up in the catastrophic Eastern wars of the mid-third century. However, documentary sources, now including the spectacular epigraphic discoveries from Apamea in Syria (Balty 1988; Balty and Van Rengen 1993), show that it was not only Asian-based regiments which were involved. It is increasingly clear that substantial numbers of soldiers from the Danube and even further west were frequently sent to the East in expeditionary armies led by emperors.

In fact, the regular appearance of Western troops in Syria antedates the Sasanian crisis. It seems to have been a general rule that a major war with Parthia or Persia was beyond the capacity of the forces based in Syria, and required major reinforcements from Europe, not because the Syrian army was of poor quality, but simply on grounds of the scale of operations against the only neighbour of Rome which was a power of comparable size.

From at least the time of Trajan (Millar 1993, 103), the movement of expeditionary forces from the Danube to Syria was a periodic occurrence which became more and more frequent into the third century. For Verus' Parthian war of 165, *legio I Minervia* came from Bonn in Germania Inferior, while from the Danube came *II Adiutrix* (Aquincum, Pannonia Inferior), and *V Macedonica* (from Moesia Inferior: Birley 1966, 165; Millar 1993, 112; *ILS* 1098; *CIL* III 6169).

In 194 Septimius Severus beat Pescennius Niger in Syria with Danubian troops, and stationed the Western-raised legions *I* and *III Parthica* there (Miller 1939, 17). He returned from Europe for his second attack on Parthia in 198. Caracalla also brought European troops east in 215–16 (Balty 1988, 99). Severus Alexander brought contingents not only from the Danube but also vexillations from the Rhine to fight Ardashir in 231, returning home in 233 (Ensslin 1939, 69; Herodian

6.3.1–4.3). The recently discovered tombstones at Apamea show that the Italian-based *legio II Parthica* was in Syria in the latter two expeditions, and it is now clear that it was billeted at Apamea again in 242–4 during Gordian III's Eastern expedition (Balty 1988, 100; Millar 1993, 146). Gordian also included troops from Germany in his order of battle (Speidel 1977, 712–14), and the Misenum and Ravenna fleets were involved as well (Millar 1993, 153). Shapur's inscription recording the defeat and death of Gordian says that 'Gordian Caesar raised in all of the Roman empire a force from the Goth and German realms and marched on Babylonia' (trans. Frye 1984, 371; Millar 1993, 154). This army, largely consisting of European soldiers, had marched down the Euphrates, surely passing through Dura-Europos. One of the three columns of Severus Alexander's army apparently went down the Euphrates (Millar 1993, 150; Herodian 6.5.1–6.6). Dura, then, may be expected to have seen troops from other, especially European, provinces on a number of occasions.

Given this established pattern of extra-provincial expeditionary forces in Syria, can we assume that the garrison which was apparently re-established at Dura on the Persian withdrawal of 253–4, comprised the same units as before, or even other elements of the Syrian army? Did *cohors XX Palmyrenorum* still exist? It is clear from the divorce document of 254 that a vexillation of *IIII Scythica* did return (*P. Dura* 32), but was it still there when the city was surrounded as much as two years later? This is a long time in any war, and the 250s were a particularly active decade on the Syrian frontier, with the old military organization undergoing catastrophic collapse requiring the presence of the emperor. Radical redeployments are to be expected, and the restored garrison of Dura may well have seen further substantial changes before the siege began. Unfortunately, there is no documentary evidence at all for other contingents; it seems that virtually all that the garrison left was their weapons.

There is considerable reason to believe that the disposable forces in Syria at the time of the reoccupation of Dura once again contained a strong element of European troops, and perhaps others from Asia Minor. The Persian evacuation was itself presumably occasioned by the arrival of Valerian at Antioch in January 255 or earlier (p. 23), and given the mauling the provincial garrisons had recently suffered (most notably at Barballissus), he must surely have disposed of considerable relief forces which, as so often before, would have been largely Danubian in composition. Sadly there is as yet no epigraphic testimony of this. However, there is evidence that the practice was still current in the 250s.

As we have seen, Apamea has produced tombstones of two cavalrymen who were buried there in 252 (Balty 1987, 229–31; 1988, 102–3), men of Pannonian regiments presumably in Syria as elements of a European expeditionary force dispatched in the previous year. The date suggests that Trebonianus Gallus also sent a hitherto unknown expedition to the East. I would suggest that eventually epigraphic evidence may be found proving that Valerian, likewise, took Danubian and perhaps other Western troops with him on his first Eastern campaign, and/or simply took command of units which had stayed in the East from previous years.

The purpose of this discussion is to establish the high probability of the presence of non-Syrian troops, from Europe and elsewhere, in Syria in 254–5, when Dura was apparently being reoccupied after a brief Persian occupation, and a new garrison assigned. Given its strategic importance and the dramatic struggle for the city which was soon to ensue, it is quite possible that the troops stationed there included contingents from outside the province (the Gallic troops caught at the siege of Amida a century later form an obvious if imperfect parallel: Ammianus 18.9.3). There is a superficially compelling piece of evidence for the idea that the siege garrison included European troops from the assemblage itself. The famous 'map shield' found by Cumont (1926, 323–37, pls CIX–CX) was thought to record an epic march by a soldier from the Black Sea to Syria (Hopkins 1979, 20–1). However, recent research concludes that it is not a shield facing but a painted leather map (Rebuffat 1986; Arnaud 1988, 1989). It therefore does not necessarily say anything about troop movements, but does at least reflect Dura's wider general contacts with other provinces.

(Incidentally, another possibility should also be noted in passing: the besieged garrison may also have included contingents of allied troops to boost numbers. Palmyra had an obvious self-interest in defending Dura against Persian attack, and in the years immediately following Dura's fall showed itself to be a formidable military power: Millar 1993, 159–73; Stoneman 1992. How were Palmyrene troops equipped at this period?)

It is quite possible then, that at least some of the regular troops holding Dura could have been from other provinces in the East or Europe. If this is so, then of course, ironically, the material from Dura would not be the testimony for the Roman army of Syria which it has always been held to be.

Deposition, recovery, recording and preservation

The current whereabouts of the material

The whereabouts of some of the small quantity of military material found by Cumont (1926) are unknown, although several items are now in the Louvre. The much larger quantities found during the Yale/French Academy excavations were, like the rest of the finds, divided between Yale and Damascus National Museum. Study of the site archive and Yale accession records establishes that the great majority of the military items went to America. Only a few pieces stayed in Damascus, including some wooden bolt shafts, a sword and most notably one of the two complete armoured horse trappers (textile coats covered with metal scales; also referred to as armoured 'housings', 'bards' or 'bardings'). The writer has attempted to gain access to the Damascus material, but the Syrian authorities, while very helpful in kindly permitting photography of the horse armour displayed in the National Museum, assured me that, so far as they knew, the remainder of the material no longer existed. However, there are substantial site records of both the sword and the horse armour, and a published account of the latter.

Yale's share of the material is now the responsibility of the University Art Gallery. At the time of writing the Gallery is undergoing a major renovation, involving moving the Dura collection to new and improved storage facilities. For many years much of the military material, including horse armour **450**, was to be seen at the John Woodman Higgins Armory

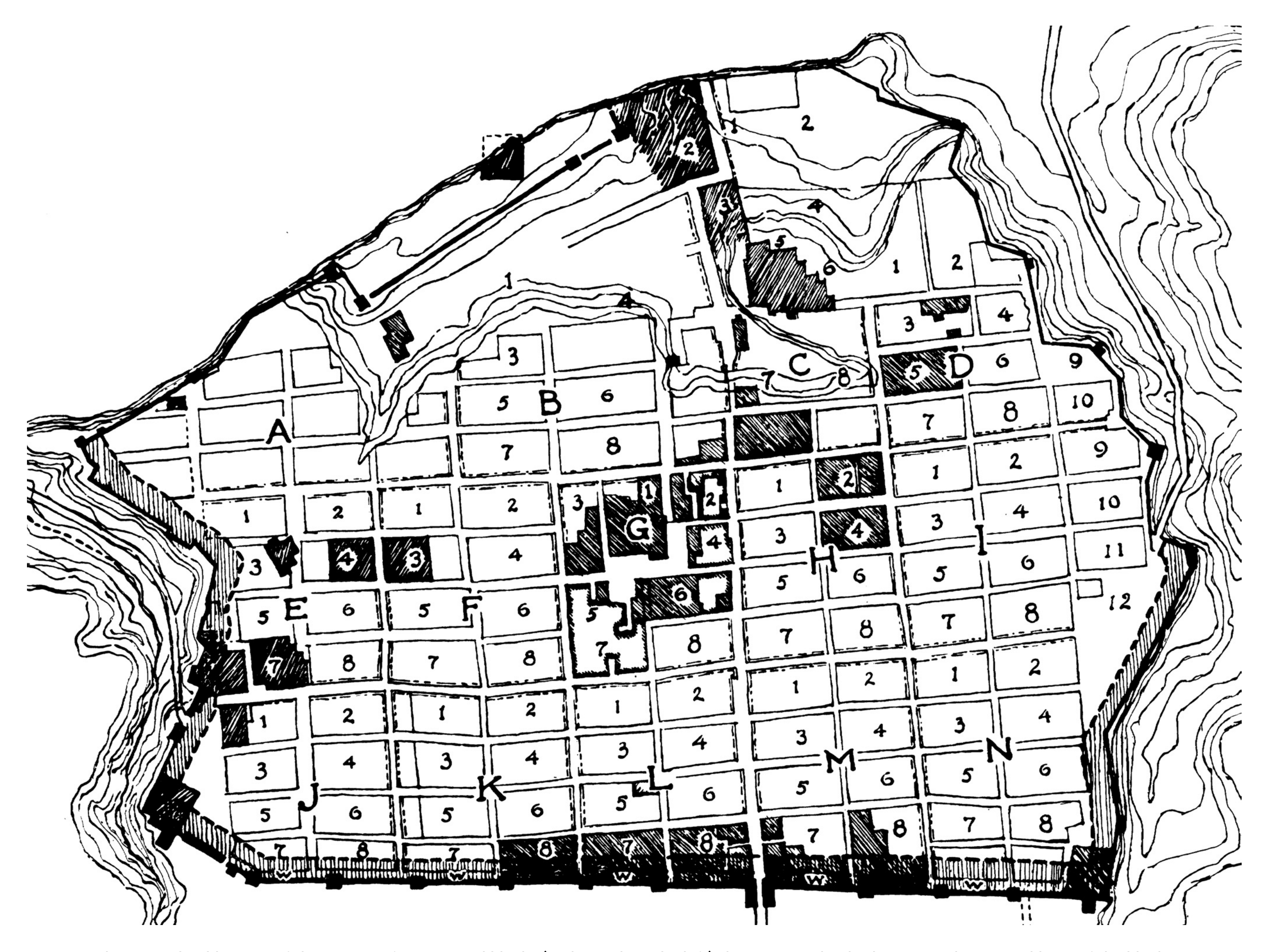


Figure 7 The original publication of the system of regions and blocks (with North to the left) shows more clearly than Fig. 5 the internal logic of the block numbering. Note also the designation of the stretches of Wall Street as 'W' (*Rep*. VI, pl. 1).

Museum in Worcester, Mass., where they were on long-term loan, although all of it has now been recalled to Yale.

Thanks to Dr John Hayes, who very kindly provided detailed descriptions and pictures, it came to my attention in September 1985 that a small quantity of material also found its way to the Royal Ontario Museum. This is a selection of pieces from the Yale assemblage given to the ROM many years ago, although no mention of this gift exists in the Yale archive.

The artefact records from the Dura excavations

The surviving paper records relating to artefacts in the excavation archive at Yale consist of several components:

1. Site-registers of finds (from the fifth season onwards).
2. A very fragmentary set of site notebooks and loose cards, containing text comments and some sketches (these seem to have been created intermittently according to the inclinations of the various excavators).
3. Some photographs of individual objects or groups.
4. Yale Museum accession record file-cards, which include studio shots of most items, sometimes incorporating the loose cards mentioned under 2.

These sources are fraught with serious difficulties arising from incompleteness, errors, confusions, and losses of information at various stages between discovery and accession at Yale either side of the Second World War. Notably, all of the field records for the tenth season (1936–7), with the exception of the photographs and the object registers, have been lost. Much of the present research has consisted of the documentary analysis of the excavation archive, and to some extent the 'archaeology' of the assemblage's 'redeposition' at Yale and elsewhere. However, future research will be greatly assisted by the fact that 'all of the photographic negatives from the archive have been scanned and linked to a searchable database now at the Yale University Art Gallery. All of the artefacts have been photographed and linked to the same database. Ultimately the goal is to put this on the internet.' (S. Matheson, pers. comm.).

The recording system used in the excavations

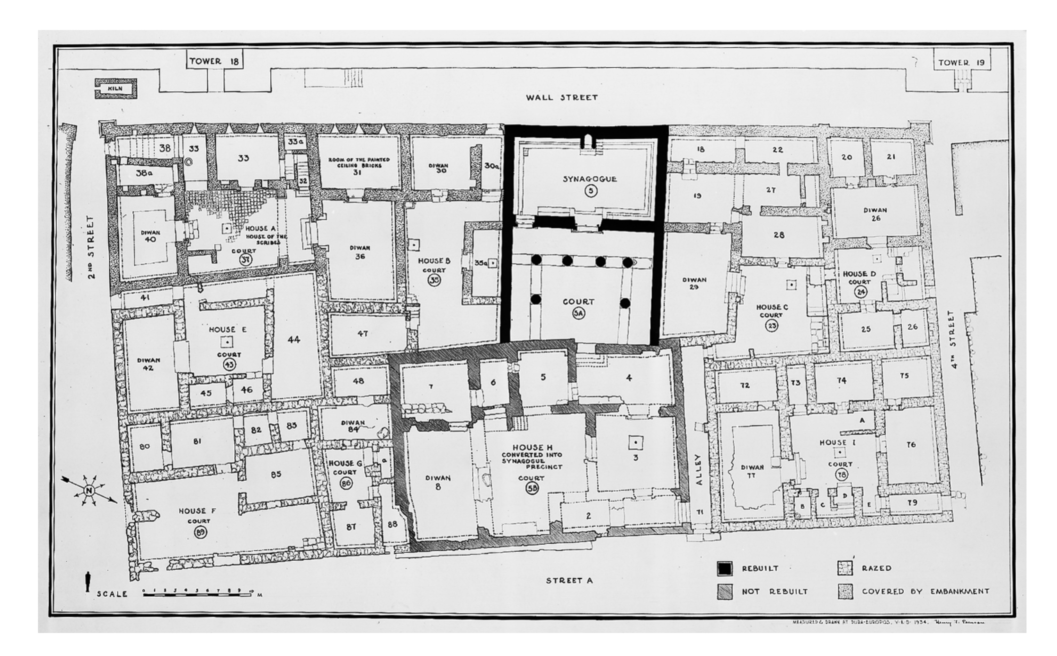
It appears that the recording system evolved in a somewhat piecemeal manner, and was neither internally consistent nor consistently applied. No co-ordinate grid was used; instead the generally rectilinear grid of streets and city blocks was employed as the basis for locating excavations and finds (Figs 5 and 7; *Rep*. II, pl. XXX; *Rep*. VI, pl. I; *Rep*. VII/VIII, on the reverse of pl. LVII). In addition, particular buildings and other foci of excavation also acquired names which were used in the publications (Tower of the Archers, Temple of Azzanathkona, House of the Scribes, etc.).

Apart from Main Street, running from the Palmyrene Gate, the east–west streets (perpendicular to the river) were

numbered, and the north–south streets lettered (apart from 'Wall Street' behind the western defences). The city was divided into fifteen lettered 'regions' (A to N and X), most of which consisted of eight city blocks defined by streets, except where the Hippodamian street grid broke down, especially on the river side of the town. Within each region, the city blocks were numbered (D5, L7, etc.). Within blocks, individual buildings were given letters, and their constituent rooms or courts were assigned numbers.

Regarding the defences, the towers were individually numbered, while the lengths of 'desert' wall, 'Wall Street' and its earth rampart fill were identified according to the designation of the adjacent city block; thus L7-W, for instance, corresponds roughly to the stretch of rampart between Towers 18 and 19. An overall plan (Fig. 7; *Rep*. VI, pl. I), shows part of this scheme, from J7-W to N8-W; the existence of provenances such as E5-W and E7-W show that the system was also used along other walls of the town, wherever there had been an earth rampart.

The meaning of the numbers sometimes suffixed to these locations (e.g. 'M7-W11') appears to have been inconsistent and confusing. No explicit record of the intended scheme appears to survive, and its application in particular parts of the site has to be deduced from the incomplete testimony of published plans. Generally, each block-length of embankment fill in Wall Street seems to have been subdivided into numbered zones, apparently of arbitrary and inconsistent lengths. M7-W was apparently divided into just two units (Fig. 8, bottom; M7-W1 and M7-W2: *Rep*. VI, pl. VI), while M8-W was divided into at least seven (Fig. 8, bottom; *Rep*. VI, pl. VI shows M8-W1 to M8-W7, but provenance M8-W10 is recorded); N8-W was also divided into a number of units roughly 10 m long (N8-W7 to N8-W11 appear in *Rep*. VI, pl. XII). There were, it seems, usually less than a dozen of these sub-units per block-length of Wall Street; with one major exception, the present catalogue records no 'W' sub-unit numbered higher than 14 (i.e. E7-W14; the highest for block J7 is J7-W8; for J8 it is J8-W11). However, 'W' numbers were not only and consistently used for stretches of Wall Street embankment fill; so, the plan of block M7 reveals that unlike most other blocks, 'W' numbers were also given to some of the rooms within block M7 itself which were incorporated into the embankment ('House W', rooms



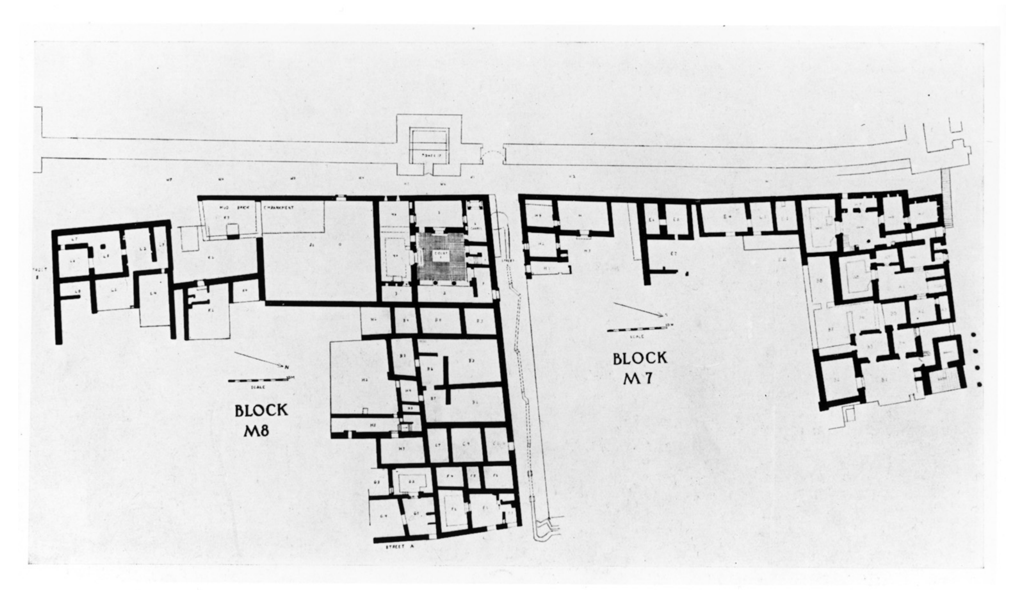


Figure 8 Plans of blocks L7 (top: *Rep*. VI, pl. 7), and M7-M8 (bottom: *Rep*. VI, pl. 6). Note the 'W' numbers in the latter, in Wall Street, and in some of the rooms of Block M7. In L7, there are no 'W' numbers shown at all.

numbered M7-W3 to M7-W7: Fig. 8, bottom; *Rep*. VI, 140–2, pl. VI). Embankment-filled rooms in the Temple of Azzanathkona were similarly given 'W' numbers (*Rep*. V, pl. III).

This last point provides the key to understanding the major exception and anomaly in the use of 'W' numbers, around blocks L7 (Fig. 8, top) and (the unpublished) L8, of critical importance since it affects the key group of material from the Tower 19 countermine complex. Here, provenances with numbers as high as L7-W60 and L8-W104 are recorded. In contrast to the published plans of the areas M8 and N8 discussed above, the plan of block L7 includes no 'W'-numbered sub-zones in Wall Street (*Rep*. VI, pl. VII). The explanation seems, in essence, straightforward; in block L, 'W' numbers were not used for subdivisions of the length of Wall Street behind blocks L7 and L8 but, as with parts of block M7 and the Temple of Azzanathkona (above), for rooms within the buildings of L7–8; the plan of L7 shows rooms numbered up to the mid-80s. It seems that, erroneously, a 'W' was inserted into all provenance codes for L7 and apparently L8: there appear to be no recorded codes *without* them (e.g. none in the form L7-60, just L7-W60).

It is suggested that behind L7 and L8 material found in, on, or below Wall Street was simply recorded as L7-W or L8-W, without numbered suffix. A couple of shield bosses are provenanced 'L8-W (T.19 sap)', clearly a mistake – the mine actually lay just into K8-W, on the edge of the L7-W excavation. However, while symptomatic of the inconsistent, fragmentary and confused state of site recording in this crucial area of the excavations, this is at least consistent with the idea that artefacts from Wall Street were being recorded (if at all) simply as part of Wall Street excavations differentiated no more finely than by city-block.

As far as the excavation of objects was concerned, it is clear that there was no consistent policy regarding what was to be collected or how it was to be recorded. For example, no human or animal bone survives, except for some fragments attached to artefacts. Any kind of recording of findspots was given minimal priority during the early seasons. Responsibility for this may be placed at the door of Pillet, the first field director. According to Hopkins, he saw no value in findspots of portable artefacts, and refused to record them (Hopkins 1979, 50–2), a neglect which is reflected in the absence of finds registers before the fifth season. This helps to explain the poverty of provenance data for much of the material.

From the fifth season onwards, in principle each object or group of objects was entered in the season's finds register, and given an identification consisting of a letter denoting the year and a numeral (Table 1). So, for example, F1333 was the 1,333rd object recorded in the sixth season. The finds registers included a brief description, such as 'sword fragments' or 'arrows' and some details of provenance. It should be noted that under such a system there can be no assurance even that objects sharing the same site-register number and provenance were necessarily found within a single stratigraphic context; they may have simply been found in the same room of a building on the same day. Even after finds registers were introduced many findspots went unrecorded, or associations were subsequently lost due to inadequacies of record keeping and storage, detachment of labels, etc.

Artefact provenances, where they exist at all, lack the precision of modern stratigraphic recording. There is often little beyond the broad co-ordinates of the city block in which an object was found, e.g. 'N8'. Sometimes there is a suffix giving more details, perhaps locating it to a particular numbered room in a building, or a stretch of wall, as discussed above. One location frequently encountered in the records is 'L7-W', the stretch of city-wall between Towers 18 and 19. From this it will be appreciated that it is usually impossible to tell exactly where an object was found in plan, let alone its stratigraphic context, whether it was from the surface (unstratified, and so possibly dropped centuries later) or under a floor (and so pre-siege, even pre-Roman).

The surviving site notebooks, written by individual excavators, are highly fragmentary, covering only a small part of the project. Most of the excavators appear not to have used them, unless they have been lost. For example, there are no substantial original records of du Mesnil's excavation of the Tower 19 mine complex, except for the sketches reproduced in *Rep*. VI, in which the major objects are given a local system of numbering (Figs 13 to 15). Unfortunately, these numbers appear to have been cross-referenced to the site finds registers very inconsistently, and so any chance of securely identifying items from this vitally important group was lost. An attempt to reconstruct it is presented below (pp. 34–7). The original sketches are also unlocated, although a copy of one of them survives in the Yale archive.

Some objects were further described on site, on cards which contain sketches, measurements and observations. Quite a number of these cards are preserved at Yale. They exist for most of the major finds of arms and armour, such as the semicylindrical shield and the horse trappers. A number of these cards and other records in the Yale archive also include details (such as site sketches of variable quality) of material which cannot now not be located, and which may not have survived. This information has been included in the catalogues.

More exact details of some individual provenances (such as the Tower 19 finds) can sometimes be gleaned from accounts in the *Reports*; as we have seen, the original records behind these are often difficult, if not impossible, to locate.

It should be noted that the recording system employed at Dura was not unusual by the standards of the time, although its erratic application was more blameworthy, and may be seen as an inevitable consequence of the scale and great speed of excavation, with a level of supervisory staff inadequate to the task. This, in turn, was largely due to the continuing pressure to produce spectacular finds which would secure funding for future seasons. Nevertheless, the resulting loss of contextual data remains lamentable.

The Dura collection and documentary archive at Yale University Art Gallery

Yale's share of the finds was shipped to the University Art Gallery at the end of each season. In New Haven it was planned to give each item a museum accession number (consisting of the year followed by a numeral, e.g. 1933.694) and a record card in a dedicated card-catalogue. Evidently the museum's staff were overwhelmed by the sheer mass of material arriving, and registration for many objects was delayed. Many were eventually given 1938.NNNN numbers in a major exercise presumably soon after the closing of the project in 1937. However, this was never completed, and any objects lacking

numbers were recently dealt with in a renewed programme during construction of the new database discussed above, using the series 1938.5999.NNNN. Accession numbers mostly refer to single objects or to groups of fragments certainly or probably from single objects, although some numbers refer to groups of items with no obvious reason to be associated.

Corresponding record cards for each item were intended to be cross-referenced with details of the object's site number, provenance, description, physical condition, references to parallels and details of its eventual publication. Each object was to be photographed and the print attached to the card, which would also hold a scale drawing if applicable, along with any cards prepared at Dura with sketches or other details of the object. Finally, the Yale accession numbers were to be cross-referenced back into the Dura site-registers. The resulting card-catalogue was to be arranged by function and/or material, incorporating a separate arms and armour section.

Such was the theory, and much of this huge task was put into effect; however, it then languished, far from complete. There are many problems with the museum archive as it now stands, arising from practices at Dura and at New Haven itself in the 1930s and after. However, happily, major strides have been made by the current Curator of Ancient Art, Susan Matheson, in sorting out and updating the archive despite, until recently, very limited funds. In 2000–1 a major grant to the Yale University Art Gallery from James Ottaway funded the digitization of the Dura archives and collection, which represents a major leap forward in making the collection available for research.

The imperfect recording at Dura, the hazards of transportation and storage, and the delays in completing accessioning at Yale all resulted in losses of information and associations of numbers, objects and provenances. Many objects at Yale either did not receive museum accession numbers or soon lost them. In the latter case they cannot be reassociated with the file cards, which often lack any detailed description, drawing or photograph. Other objects in the card catalogue could not be identified in the stores, at least in part due to the past renumbering of some pieces; the silver baldric fastener (**17**) has had no less than three Yale numbers associated with it.

In recent years Susan Matheson and her assistants have brought order to the collections and ensured that all the material discussed here has proper accession records. However, the loss of information and associations during the 1930s and soon after has had the extremely serious consequence that it is now impossible to match with certainty most of the items in the museum collections with artefacts appearing in the site archive. Of course, some equations are obvious enough, and in practice it is often possible to suggest with a fair degree of confidence where a now unprovenanced object came from within the city. For example, most of the metal shield bosses (*umbones*) now at Yale may almost certainly be assigned to the Tower 19 countermine. We know that many *umbones* of copper alloy and iron were found there, and some correspond in detail with those in du Mesnil's sketches of the complex. Furthermore, according to the records, it appears that hardly any bosses were found elsewhere. Nevertheless, the loss of proof of association, the lack of detailed provenances and the absence of any information at all for many objects place substantial constraints on what may be done in analysing the assemblage. For example, it makes drawing any but the broadest conclusions about the distribution of finds within the city very risky.

The condition of the material

Survival, preservation and microenvironments

Dura is unlike most Roman military sites in Europe, where the great majority of organic material decayed long ago and only metal and bone survive. At Dura leather, textile and wooden parts of arms and armour virtually unknown elsewhere were preserved. For example, four complete items of scale armour were found, including two armoured horse trappers, **449** and **450**, still with their cloth backing, leather edging and stitching, as well as two cuisses (thigh-guards) of laced leather scales, **441** and **442**. To date these are the only intact examples of scale armour from anywhere in the Roman world. Dura also provides us with our only complete wooden catapult bolt shafts, and even reed arrowshafts with their original fletching. Perhaps the most famous pieces are the remarkable wooden shields. Complete shield-boards are known from elsewhere in the empire (p. 166–7) but the Durene examples are the only ones to preserve their brilliant painted decoration (although see the recently identified fragmentary shields from Egypt: Goethert 1996).

These remarkable survivals were due to the creation of certain microenvironments around and beneath the towers and curtain wall of the western defences, due to the circumstances of the siege. The encasing of the walls in a steep-pitched earthen rampart drained off winter rains (which can be torrential) before they could penetrate, keeping the interred remains permanently dry, a circumstance which also explains the survival of the famous synagogue murals and other remains. In fact, unusually good preservation was confined to this very localized context. Elsewhere organic materials did not usually survive at all. Metal objects show a similar pattern, exhibiting a wide range of degrees of oxidation. Unsurprisingly, the well-preserved pieces are generally from the towers and embankment contexts; some of the iron bolt-heads found in the towers still preserved their original shiny surface, marred only by superficial localized pitting. Metal buried in the flatter areas of the town was usually far more corroded and, especially if shallowly buried, could disintegrate entirely. In this much more hostile environment, thicker copper alloy castings generally survived better than thin plate such as armour scales; this is well-illustrated by the survival of cast twist-keys from scale shirts (e.g. **420–431**), which are probably all that remain of whole garments made of textile, leather, and thin metal scales. In the case of iron, as I observed during recent examination of newly-recovered ironwork from the site (James forthcoming), much is completely mineralized and in a state of disintegration when found. Paradoxically, and in contrast to the copper alloy pieces, larger iron objects and thicker forgings often tend to be in poorer condition than small or thin items (e.g. arrowheads), apparently due to the proportionately greater internal stresses induced by crystallization of oxidation products. In summary, it is clear that, apart from the remarkable survivals from the embankment microenvironment, differential corrosion and decay has had a major impact on the apparent overall composition of the assemblage, for example in favouring differential survival of copper alloy over iron items, and of metals over organic materials. Except along the walls, processes

of differential decay were as significant at Dura as at any comparable excavated site in the Roman world.

Condition of the material: conservation

While many items have been cleaned and some of the metalwork lacquered, many other pieces housed at Yale have not been conserved, but are more or less as they came out of the ground. They had for the most part been buried in dry conditions and are largely stable in their unconserved state.

The conservation measures which were taken on some of the objects soon after their arrival in the 1930s have not always proved beneficial. The most extreme and unfortunate cases are the painted oval shields **616–618**. The binding agent applied to consolidate the pigment has darkened and cracked, lifting the pigment from the wood and effectively destroying the paintings. The agent was probably a nitro-cellulose varnish, used on other items from Dura in the 1930s, which produced a characteristic brown discoloration (Stout and Gettens 1932, 1, 3). The wooden boards are unaffected and are in good condition.

Also in a generally sound state are the other wooden objects such as catapult bolts, which, although often worm-ravaged or charred in antiquity, generally remain robust and stable without treatment. The surviving leather (for example, anti-chafing strips around the edge of scale armour) is in equally good condition; much of it was cleaned and conserved by Gannser-Burckhardt (Kaplan 1971), although the process used appears in some cases to have destroyed the colour of the leather while preserving its form. Textile backing of scale armour varies in condition from a state of total disintegration to virtually complete survival of its original flexibility and tensile strength. This was illustrated most dramatically in the case of the scale horse armours from Tower 19. The cloth onto which the scale rows had been sewn was quite strong enough for the armours to be taken straight out of the ground and placed on the back of a pony to be photographed – an act, however, likely to be deplored by modern conservators (Fig. 74)!

Deposition of the assemblage

Arms were found in most parts of the city: fragments of body armour in the barracks, stone artillery projectiles in the citadel, etc. A few items certainly date from earlier phases of the city's development. For example, the necropolis produced some iron arrowheads whose deposition probably predates the siege, although there is evidence of disturbance. Similarly, the copper alloy arrowheads include Bronze Age types and are all regarded as residual, with none likely to date later than the Hellenistic period. Some items are considered probably pre-siege, even pre-Roman, on typological grounds (p. 194). However, it is evident that the bulk of the larger and more complete artefacts came from well-stratified deposits laid down shortly before, and especially during the course of, the final siege, in contexts along the western ('desert') wall. Elsewhere in the city such arms as survived were far more exposed to decay as they were not deeply buried and were therefore vulnerable to the winter rains and biological processes of decay. The heart of the city was also much more vulnerable to looting when the city was sacked, resulting in the apparent removal of all but small fragments of arms from the interior. The limited information to be gleaned from distribution patterns within the city is explored below (pp. 235–6).

Dura's destruction provides a clear *terminus ante quem* for most finds, and an unusually precise bracketing for the siege-sealed groups – however, the original composition even of these can only be partially reconstructed from the artefacts now in museums (see below).

Preparations for a siege, and the subsequent fighting

The final resistance of Dura to the Persians was anticipated by massive preparations, and resulted in diverse siege operations and counter-measures. The story of the siege is entirely derived from archaeology; there are no surviving documentary accounts. There have been earlier accounts of the siege operations at Dura (not least *Rep*. VI, 187–205). However, the current renewed research has made important additional discoveries. The following is based on the new overview presented by Leriche (1993a), supplemented by more recent work at Dura (P. Leriche and M. Gelin, pers. comms), and my own observations. Because there is no up-to-date account of the remains and their interpretation in English, and because the deposition of the best parts of the assemblage resulted from these events, they are described in some detail here.

The state of the walls, and their reinforcement to withstand a siege

Dura's wall circuit was Hellenistic, constructed in the second half of the second century BC, and ran along the edge of the wadis and the river cliffs which bound the city on three sides. A substantial straight curtain wall, reinforced by eleven towers and pierced by a strongly fortified central gate, closed the city off from the open plain. Under Parthian rule from 113 BC onwards the defences were neglected, and an earthquake in AD 160 caused serious cracking in the towers (Leriche 1993a, 83–4).

It is now known that there was more than one siege of Dura; it is unclear whether Trajan took the city by force, but in AD 165 the Romans seem to have breached the walls. This damage was repaired in mud-brick (Leriche 1993a, 84). Recently evidence for siege-mining, probably from the second century, has been found ('Abdul Massih 1997, 49–50, 53, figs 8, 10, 11).

The beginning of the third century AD witnessed the construction of the *principia* ('*praetorium*') and the palace of the *dux ripae*. At the same time the city walls were thickened and the towers strengthened, probably to take artillery. The intramural road had acquired two metres of deposit in the Parthian period, making it impossible to enter most of the towers at ground level. Consequently the Romans built stairs at regular intervals to provide access to the upper floors of the towers and the battlements (Leriche 1993a, 84).

In its last years, under threat of Persian attack, further measures were taken to improve the defences of the city (Fig. 9). A glacis was added to the front of the old Greek wall facing the plain and, as is now known, was also carried along the defences lining the northern wadi and probably the southern too (P. Leriche, pers. comm.). Made of earth, gravel and cinders, and faced with mud-brick and layers of reeds, it was 8 m high, and 6 m thick at the base. Behind the wall, the already partly buried Wall Street was filled with earth up to wall-walk level; this fill was supported at the rear by the

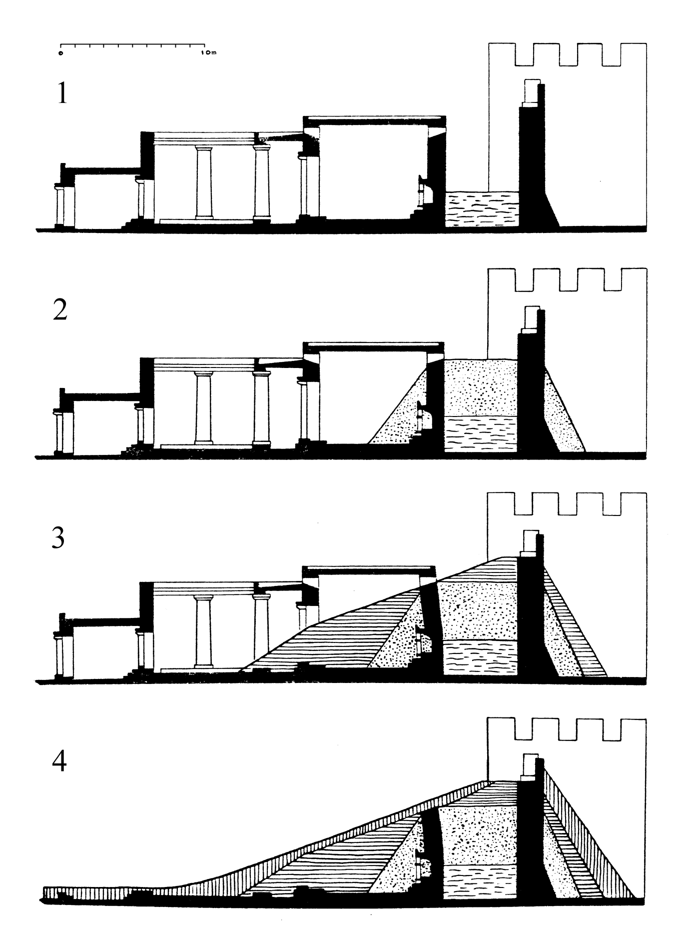


Figure 9 Cross-section of the 'desert' wall, Wall Street and block L7, through the synagogue, looking south towards Tower 18. It shows the deposits accumulated in Wall Street during Parthian times (1), and the strengthening of the defences which preceded the siege. The outward thrust caused by the filling of Wall Street was counteracted by the addition of a supporting glacis to the front of the curtain wall, and revetments inside the still-standing buildings behind (2). However, the latter proved inadequate. The rear revetment was greatly expanded (3), and then the exposed parts of the buildings demolished to create a deep sloping rampart easily accessible from the interior, while the glacis was also massively strengthened (4).

buildings along Wall Street, and projected down the perpendicular streets to form ramps leading to the walls. The walls and towers were also heightened with mud-brick to an unknown degree; these additions were heavily eroded when excavated. This great effort is dated to 253 or later by coins and other finds in the first inner rampart (Leriche 1993a, 84).

Soon afterwards, the buildings supporting the rampart in Wall Street began to collapse. A massive project was then undertaken to fill them with earth in order to support and deepen the internal embankment. Walls left projecting from the enlarged rampart were demolished, leaving an open slope. The enlargement is dated to 256 by Leriche (1993a, 84), but seems to me to be slightly less precisely datable, to some time between 253 and the final siege. In the process, a number of wooden shields, as well as the papyri and many other objects, were permanently buried.

A low secondary wall, like a *proteichisma*, was constructed 6 m in front of the Palmyrene Gate as an additional measure.

The Sasanian attack

> And let them, when besieging a fortress, strive to win over whomsoever possible of those inside the fortress and the city, in order to attain through them two things: one – the drawing out of their secrets, and the other – intimidating and frightening them through themselves. And (let) a man be sent by underhand means who should unsettle their minds, and deprive them of any hope for succour, and who should tell them, that their sly secret is unravelled, and that tales are told about their fortress, and that fingers are pointed at their fortified and weak places and at the places against which battering-rams will be directed, and at the places where mines will be conducted, and at the places where ladders will be placed, and at the places whence the walls will be ascended, and at the places where fire will be set – in order that all these should fill them with terror . . .
>
> (Fragment from the (late?) Sasanian *Book of Ayin*, translation adapted from Inostrancev 1926, 16)

The scale and composition of the attacking force are wholly unknown. It presumably arrived upriver from the direction of Ctesiphon, driving in Roman patrols as it advanced (it is unlikely to have been able to catch the city by surprise). Whether its commander sought the city's surrender or tried an immediate attack is unknown. The massive siegeworks which resulted reveal the defenders' determination to hold out, and the Persian decision to spend the time necessary to reduce the city. This may have been either to eliminate a concentration of Roman troops too dangerous to bypass, or for wider political reasons (if the city was regarded as a Sasanian possession in revolt; p. 23), or both.

How the Sasanians invested the town is unclear. Their army established itself on the plain facing the western wall, and surely also across the flanking wadis and especially outside the now lost river gate, investing the city as closely as possible, although no trace of circumvallation works has yet been identified. They would have sought to cut off communications, but *contra* Leriche (1993a, 84), it seems doubtful whether they could have entirely prevented use of the river by the defenders. Inability to seal off the city may be one reason why it had to be carried by assault. The attackers would have faced difficulties of their own, not least their need of access to the river for water – a hazardous undertaking in the face of the artillery of the defenders.

The Persians would have established a camp, perhaps fortified as Leriche suggests (1993a, 84). Leriche notes the linear features on the plain visible in air photographs, which he suggests are too flimsy for a siege camp, but may simply be the edges of the old French Air Force airfield (1993a, n. 17). Recent excavations suggest that it probably was the Sasanian camp wall: it is post-Trajanic, and it is apparently built of characteristic bricks also seen in the siege ramp (M. Gelin, pers. comm.). Given the range of Roman artillery it is not implausibly far away to have been a siege camp, and its flimsiness is not really an objection. Roman camp circuits were designed simply to hinder surprise attacks, and were often lightly built. (There are at least three known historical contexts for Roman camps outside Dura, under Trajan, Lucius Verus and Julian, not to mention the possibility of other armies in transit camping beneath its walls [pp.24–5]. However, to date only the apparent Persian camp has been identified.)

Throughout the siege we can assume frequent missile exchanges all along the walls as each side attempted to cover its own working parties and teams engaged on counter-measures, while disrupting those of its opponents. Recently, a shrine which had been commandeered as an artillery-stone magazine and apparently used also as a field smithy was excavated on the main street near the Palmyrene Gate (Leriche and Mahmoud 1994, 416–17, Leriche 1997, 91–2; James forthcoming).

The Persians can be shown to have made concentrated attacks on the western wall at several points. The identified foci are as follows:

- A direct assault on the Palmyrene Gate
- An attempt to bring down Tower 19 and a stretch of the adjacent curtain wall by mining ('sapping')
- An attack, by a combination of assault ramp and mines, against the south-west corner of the defences between Towers 14 and 15

Archaeology does not provide any information on the sequence of these attacks. We cannot tell whether the Persians were numerous enough, determined enough, and in a sufficient hurry to launch all the known attacks at once; the mining and ramp operations would have taken many days, if not weeks, to effect. Perhaps the most plausible sequence is that, after the failure of the direct assault on the Palmyrene Gate, the Tower 19 mine (which will have demanded relatively little manpower) and the massive ramp were pushed ahead in parallel, to permit simultaneous attacks at two points, in order to overstretch the defenders and hasten the outcome.

There may well have been other attacks which have left no trace. For instance, it may be expected that the Persians tried a direct assault on the defences with simple techniques such as storming parties with scaling ladders before they settled down to time-consuming siegeworks. Such attacks are unlikely to be detectable now. It should also be noted that the other obvious focus of assault, the low-lying River Gate, was later destroyed by the Euphrates, so no evidence survives of the presumed siege operations there.

The attack on the Palmyrene Gate

Gates, as potentially the weakest points in the defensive circuit, were always a prime focus for attack. The early excavations of the massively fortified Palmyrene Gate and its immediate vicinity showed extensive signs of burning and yielded much military equipment, both within and in front of the structure itself. Further recent excavations in front of the gate have revealed traces of apparently ferocious fighting. The courtyard made by the secondary wall in front of the gate was full of projectiles and other items such as pieces of iron plate, probably from some kind of siege machine. There were extensive traces of burning (Gelin *et al*. 1997). The attack was evidently unsuccessful, and the gate remained impassable even after the city fell.

The attack on the south-western corner of the town

The most elaborate sequence of siegeworks attested at Dura consisted of a combination of a mine intended to bring down Tower 14 and an assault ramp between Towers 14 and 15, supplemented by one or two mines intended to pour troops directly into the town (Figs 10, 11).

An assault ramp was constructed, consisting of earth between two sloping mud-brick walls, additionally protected from missiles shot from the corner tower by a fired-brick, mortared wall. The ramp was 8 to 9 m high and was 40 m long (Figs 10, 11:A). Today it still overtops the stone walls by 2 m, and presumably came up to the top of the mud-brick heightening of the city wall. The ramp was paved with fired bricks, which surely implies that it was intended for a wheeled siege engine, probably a tower (Leriche 1993a, 85). The Roman defenders took counter-measures, raising their own walls and thickening this stretch of the rampart, while sapping the ramp itself (Figs 10, 11:B).

Tower 14 almost certainly housed powerful engines which impeded the work on the ramp, shooting at the attackers from their most vulnerable, unshielded right side. From the southern wadi, the Persians undermined the troublesome source of the shooting. The tunnel constructed for this purpose was 40 m long. Unlike that at Tower 19, the mine under Tower 14 was successfully placed to make the tower collapse outwards (Fig. 11:C). The gallery was 1.8 m high and 1.35 m wide at the base, with props. The miners made some air-holes, which today allow access to the still partly open gallery. Some of the props are still in place, only partially burnt. The excavators found sulphur crystals and bundles of twigs impregnated with bitumen from the firing of the mine (Leriche 1993a, 85).

Parallel with the ramp's construction, and the 'neutralization' of Tower 14, a mine was dug under the ramp and into the town (Fig. 10, mine 4). The excavators attributed the tunnel to the attackers, on the basis of orientation of pick-marks, and because the wall base-blocks had been pulled outwards. Bigger than the Tower 19 mine, it was clearly intended to let troops into the city (Leriche 1993a, 85), permitting them to attack from behind the defenders facing the assault ramp.

Another Roman countermine enabled the Romans to seize this Persian assault mine and to sap the ramp. The excavator concluded that two Roman mine-galleries had been dug into the ramp itself, to try to make it unusable (Fig. 10). Perhaps to counter the Roman activities under the ramp, the Persians dug yet another sap (mine 3), parallel to the thwarted mine 4 (Leriche 1993a, 85–6). However, they do not seem to have been able to prevent the Romans firing their mines under the ramp, putting it out of action, at least for machines (Fig. 11:C).

(A further supposed Roman countermeasure, which seems to be a long gallery about twenty metres behind the wall and parallel to it, was originally believed to be intended to intercept any other Persian tunnels. However, Leriche is inclined on present evidence to interpret this as a partly natural crevice in the rock, used as a drain, and not part as of the siegeworks: see Leriche 1993a, 86.)

The attack on Tower 19

A mine was directed at Tower 19, 150 m north of the Palmyrene Gate, from a point out on the plain. A mound of earth, probably the spoil from the mine, lies *c*.40 m out from the tower (*Rep*. VI, 189). The northern and western sides of the tower, and 15 m of the adjacent curtain wall to the north, were undermined (Fig. 12). This was a classic sap, with pit-props and planks supporting the walls preparatory to firing (Leriche 1993a, 84–5). Clearly its purpose was suddenly to open a breach in the wall wide enough for a column of troops to break into the town over the rampart. Bringing down the tower on the attackers' right would also reduce the threat of missiles from their most vulnerable, unshielded side.

Another tunnel under the inner rampart connected these workings with a house inside the town (Fig. 12). Before the mine was fired, this second gallery was blocked at each end by masonry, that at the town end built from the town side, that at

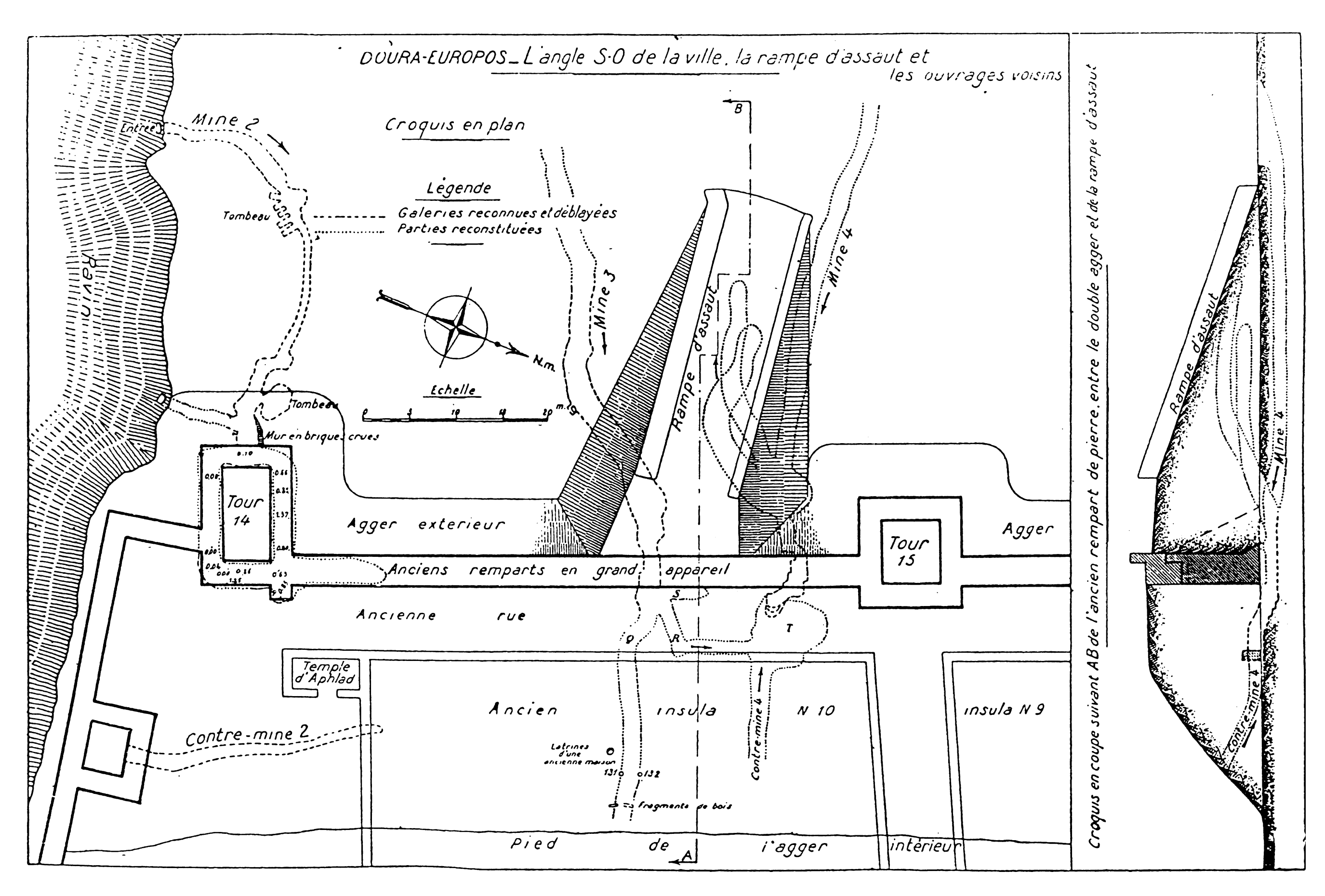


Figure 10 Plan and section of the siegeworks south of Tower 15, showing the Sasanian assault ramp and the complex of mines beneath both ramp and Tower 14 (after Du Mesnil 1944).

the mine end from the outside. In between these walls were numerous bodies and items of arms, armour and incendiary materials (Figs 12 to 15; Leriche 1993a, 85).

It is reasonably certain that the gallery under the inner rampart was a Roman countermine, as du Mesnil believed. It cannot be interpreted as an assault tunnel dug by the Persians to allow troops into the town, since the works under the wall and Tower 19 were clearly intended to make these collapse – thus cutting off the inner tunnel from the Persian lines, which would be nonsensical. Evidently the Romans detected the mine (since activity around its mouth must have been impossible to disguise on the flat plain), and dug a tunnel of their own to intercept the attackers. The deposits in the mine are consistent with the idea that the Romans were worsted in what was surely a horrific fight underground in the dark and, panicking, sealed the mouth of their own tunnel to prevent the Persians taking advantage of it to enter the town. This trapped a number of Roman soldiers, probably all already dead or wounded. At least one apparently Persian soldier ended up lying nearby (Figs 13 and 52). Du Mesnil suggested that the Persians quickly fired the Roman countermine, causing it to collapse in the middle. They then blocked their end of the countermine to stop the Romans reopening their tunnel (*Rep*. VI, 198).

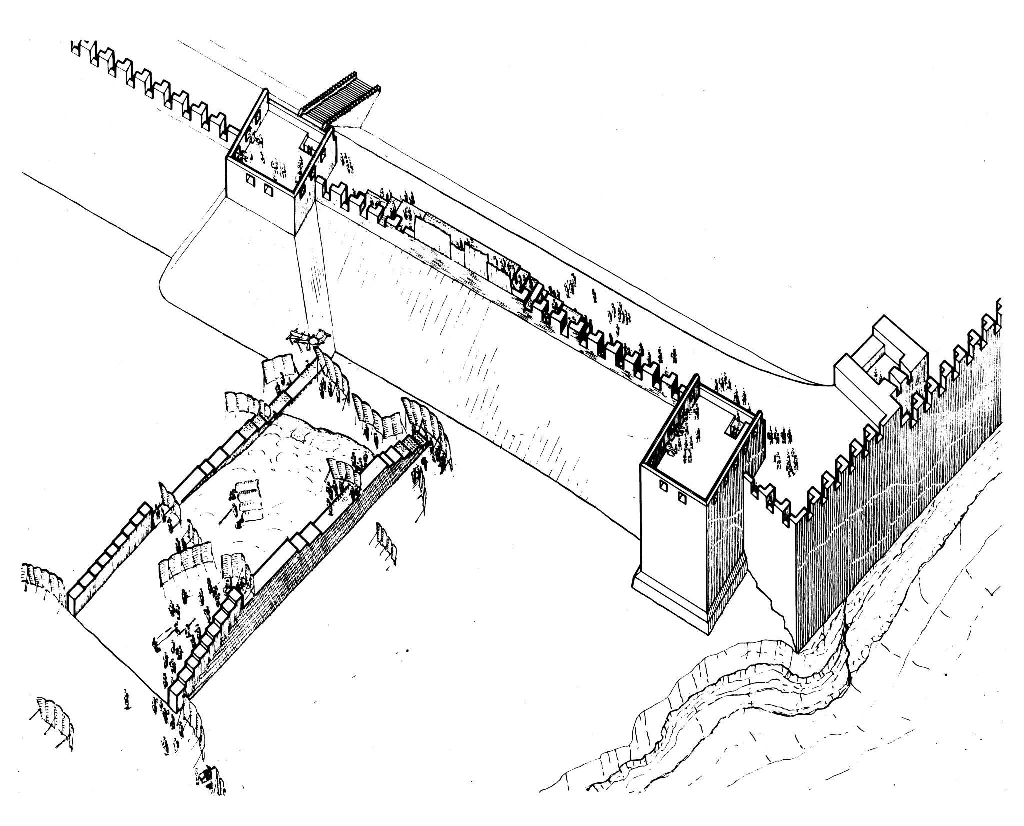
The attackers completed their mine and fired it. Ironically after the desperate struggle for possession of it, the mine failed: instead of collapsing and rolling out into the plain, the wall and tower sank more or less vertically into the ground, but supported by the enclosing earth rampart and glacis, stayed upright, if rather drunkenly (Fig. 16). To be sure, the internal floors of Tower 19 collapsed, trapping between them the famous '*scutum*', the sets of horse armour and other items (see below). However, no practicable breach was made in the defences. The defenders were able to patch the defences by filling the shattered tower with earth, and re-established the wall-walk and breastwork on top (Leriche 1993a, 85).

The duration and outcome of the siege

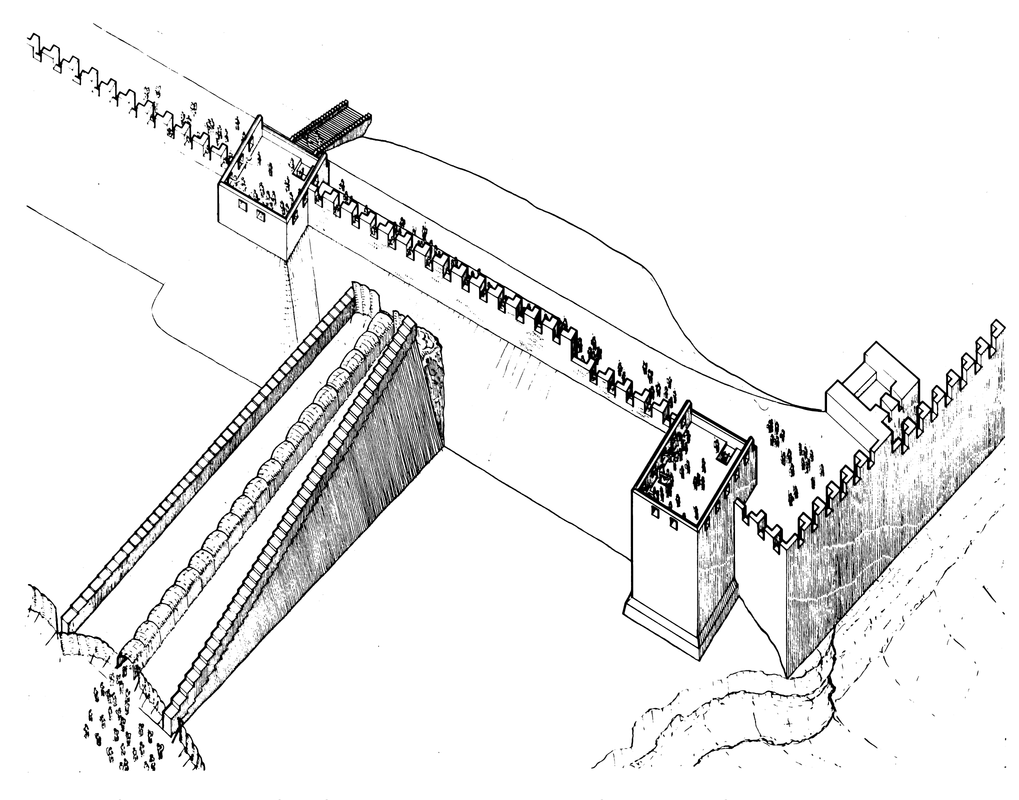
It is hard to estimate how long the siege lasted, but the scale of the siegeworks and the complexity of measures and counter-measures revealed by excavation argue for some weeks at least. The city's death was evidently a prolonged ordeal. Archaeology has not shown exactly how the Persians eventually forced their way into the city – if they did. All the known assaults appear to have failed, although they left the defences in a precarious state. Unless the Persians broke in at the River Gate, or made a successful but unidentified assault somewhere else on the wall circuit, it may be that the Roman defenders surrendered in the face of sustained and massive attack with no evident prospect of relief.

The military artefacts from the siege phase

While it is believed that many of the unprovenanced items, and the pieces provenanced from within the town, were probably deposited during or immediately after the final siege, several important and more or less well-documented groups of military artefacts were recovered from contexts certainly laid down very shortly before the town was invested, or during the fighting itself. These comprise:



A: The attackers commence construction of a siege ramp, with assault mines beneath. The Romans respond by heightening the wall, and enfilading the ramp from Tower 14 (right).



B: The ramp approaches completion, while the Romans continue to strengthen the rampart. The Persians are undermining the troublesome Tower 14, while the Romans are doing likewise to the ramp.

Figure 11 The Persian siegeworks and Roman counter-measures around Towers 14 and 15.

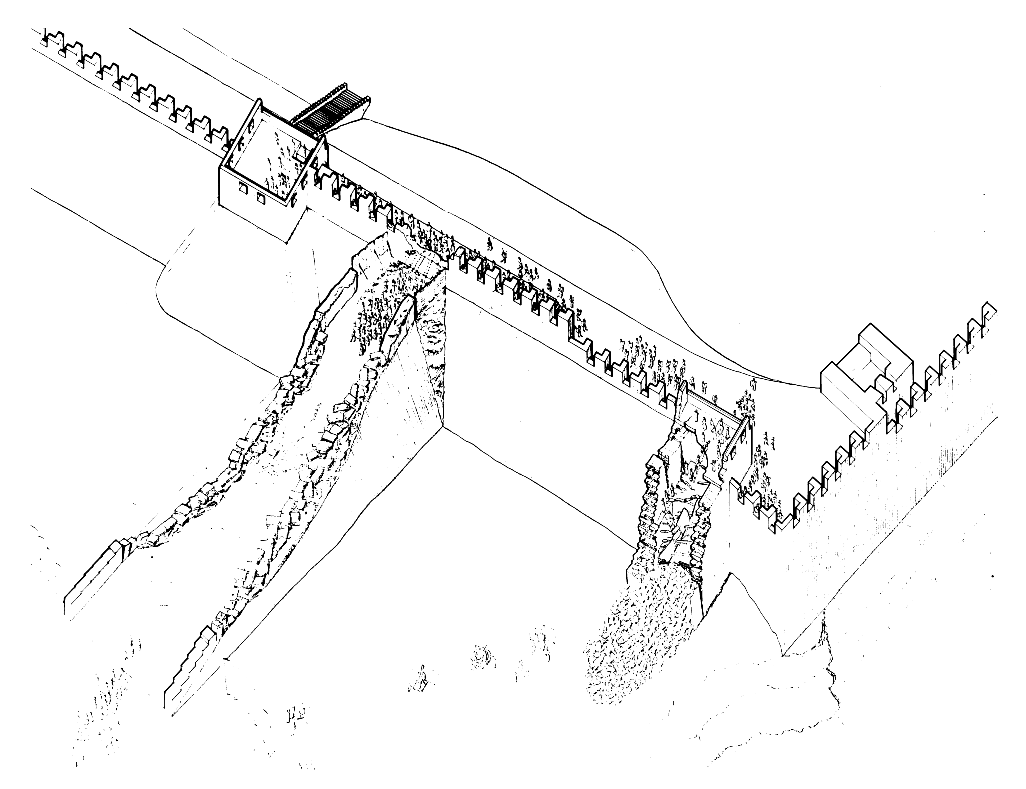
- The shields in the rampart: deposited no more than some months, at most a year or two, before the town was invested.
- The Tower 19 countermine deposits.
- The Tower 19 collapse deposits.
- Others deposits from wall towers and the rooms of the Palmyrene Gate (generally less well documented).

MATERIAL DEPOSITED DURING PREPARATIONS FOR THE SIEGE

At three different points along the western wall, wooden shield-boards, stripped of their metal fittings, were deposited in the fill of the embankment, presumably having been discarded as valueless. The highly decorated shields **616**, **617** and **618** were found together, **619** and **620** elsewhere (*Rep*. VII/VIII, 326–69).

THE TOWER 19 COUNTERMINE DEPOSITS

This spectacular discovery, largely consisting of human skeletons, arms and personal effects, was excavated by du Mesnil in the sixth season (Figs 12 to 15; *Rep*. VI, 192–9, 204–5,



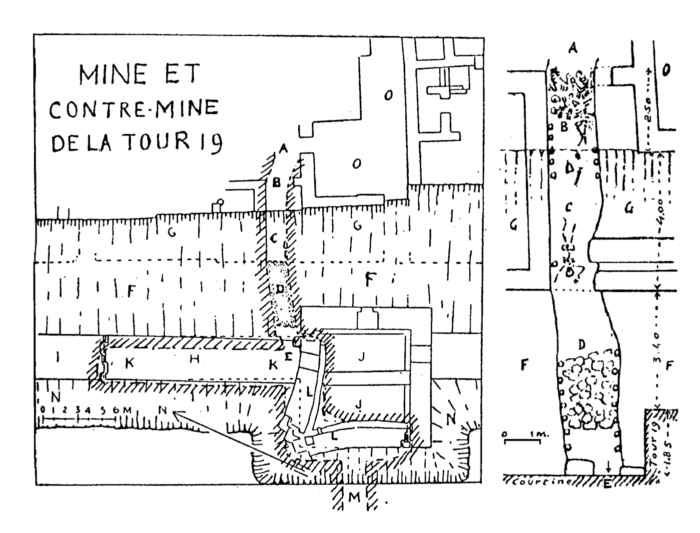
C: Tower 14 is destroyed, but so is the assault ramp. A bloody stalemate?

Figure 11 *Continued*

470–5, figs 16–18, pl. XVIII). Sadly, apart from one or two pictures of the 'Persian' skeleton (Fig. 52), and the helmet **371** *in situ* (James 1986a, fig. 14), no photographs of this remarkable deposit survive, and neither are there any original records or site drawings in the Yale archive, although there is a French typescript, apparently du Mesnil's draft of the account published in *Rep*. VI.

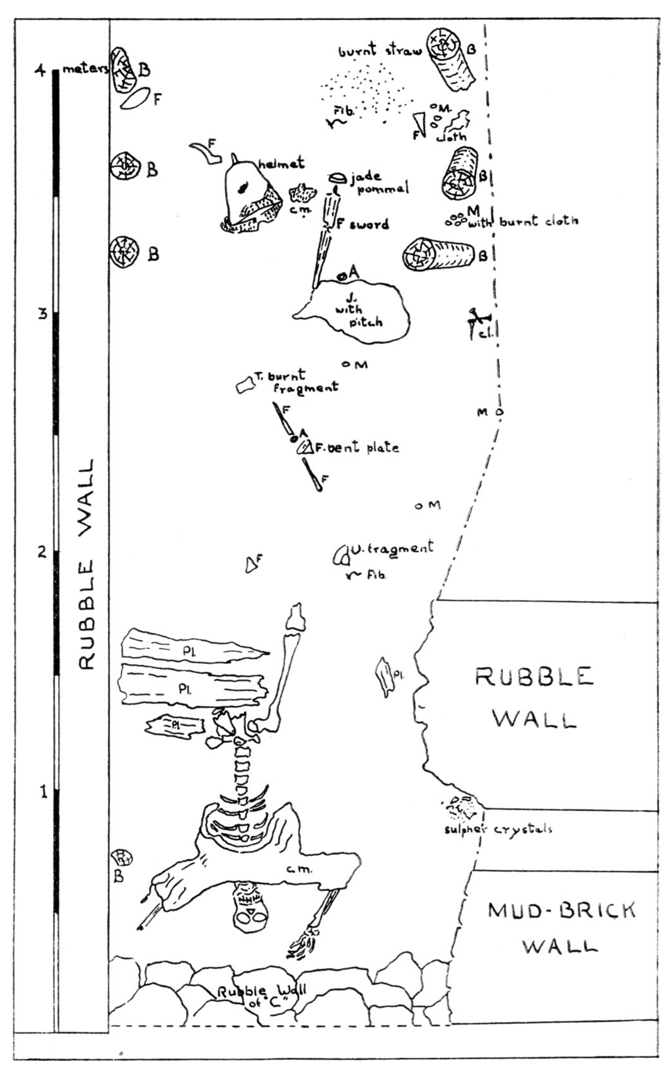
The published plans and section of the mine deposit are not easy to reconcile, but they are reproduced in Figs 12 to 15. The spatial interrelationships of the plans and section are unclear in the original publication, and difficult to determine; however, the solution offered in Figs 14 and 15 seems internally consistent.

The relationships between the three published detailed plans of the mass of bodies (Fig. 14) present particular difficulties (no surviving set of site-plans is known). In the original publication (*Rep*. VI, fig. 18), the drawings here labelled A, B and C were reproduced in the order A:C:B (from the left), with their lower (western) margins aligned, apparently indicating how they were to be superimposed as, it seems at first glance, a series of plans of successively deeper layers in the deposit. While two of the drawings (Fig. 14:A and B) can be related together on the basis of the positions of bosses U1, U4 and U5 and skull T3, which appear in both, neither contains any item common to the third plan (Fig. 14:C). A general idea of the relation of the latter to the others can be obtained from the section, which itself is not located on any of the plans (Fig. 14:D; *Rep*. VI, fig. 17). This shows bosses U10 and U11 of plan C, with U6 and skulls T3 and T6 of plan B, permitting an approximate correlation between the plans (and indeed the section). However, the latter three items do not lie in



A Entrance to the Roman countermine
B Deposit of Roman skeletons
C Burnt zone, 'Persian' skeleton
D Persian blocking wall
E Point of junction between Persian mine and Roman countermine
F Wall St, buried under the interior rampart
G Rear glacis covering part of the Wall St buildings
H Curtain wall between Towers 19 and 20, partly displaced by the mine (original alignment shown by dashed lines)
I Intact wall
J Tower 19
K Persian mine under the curtain wall
L Persian mine under the western walls of the tower
M Persian access tunnel to the mine
N External glacis
O Alley and space separating blocks L7 to the south, and K8 to the north

Figure 12 The best surviving overall illustrations which show the conformation of the discoveries at Tower 19, including the Persian mine and Roman countermine (from Du Mesnil 1944, figs 3 and 4).



Key (after *Rep.* VI, fig. 18):
A. Bronze ring
B. Post
Br. Fragment plywood shield, painted rose
Cm. Coat of mail
Cl. Nail
Ch. Bronze chain
Fib. Fibula
F. Iron Blades or plates
Fm. Femur
H. Humerus
I. Iliac bone
J. Sherd
M. Coins
Mx. Maxillary bone
P. Stone
Pl. Plank
R. Bronze disc
S. Foot with shoe
St. Sternum
T. Skull
Tc. Spike head (?)
U. Umbo
V. Vertebrae
Z. Bronze plate, bent, greave (?)

Figure 13 Tower 19 countermine, western part with 'Persian' skeleton (after *Rep.* VI, fig. 16).

any single vertical plane: drawing D is thus a composite elevation, not a true vertical planar section through the deposit.

Nevertheless, these observations of points of connection between the drawings suggest a more precise probable solution for their true spatial interrelationships. It is clear, from the positions of the items common to both plan A and plan B, that the *eastern* (top) edges of the drawings should be aligned, not their western (lower) margins as in the original publication. If it is supposed that the same applies to drawing C, then it may be seen that all the elements recorded in the 'section', D, are indeed brought close together in plan.

The order in which the plans were actually drawn, and what they represent in terms of stratigraphy, is less clear. However, it should be noted that D is not actually a true section, but a composite; similarly, in whichever order they were drawn, there is evidence that the three 'plans' do not record horizontal layers; drawing C, for example, shows both U10 and U11, which according to the 'section' are at the top and bottom of the deposit respectively.

The explanation favoured here is that the three 'plans' do not represent successive stages of modern-style excavation in plan from the top down, but are rather composite sketches of items from various depths, recovered during clearance primarily *along* the tunnel from west to east: this becomes clearer if we arrange the drawings in the order here called A:B:C (Fig. 14).

Fig. 15 is an attempt to reconstruct a single, composite plan of the countermine deposit by superimposing plans A to C according to the reconstructed common alignment suggested above, and adding the published plan of the rest of the tunnel with the body of the 'Persian' (Fig. 13; *Rep.* VI, fig. 16; see below) in what appears to be its correct spatial relationship. The result matches very well with the only published drawing of the entire countermine complex, a tiny sketch by Du Mesnil (Fig. 12, *right*).

Given the difficulties and discrepancies of these records, it is also likely that the drawings do not show every object recovered from the deposit.

Equating most of the items depicted in these drawings with objects in the collection is problematic, since there appears to have been little systematic attempt to label finds as specifically from the mine and the few references that do exist are clearly confused: the provenance of **595** and **607** is given as 'L8-W (T.19 sap)', but the saps at Tower 19 are in K8-W! Some other items, provenanced 'L7-W', may also be from the mine but mislocated. Nevertheless, it is possible to propose at least a partial reconstruction of the mine group, identifying with varying degrees of confidence objects currently in the Yale collection with those mentioned or illustrated in the published account (Table 2).

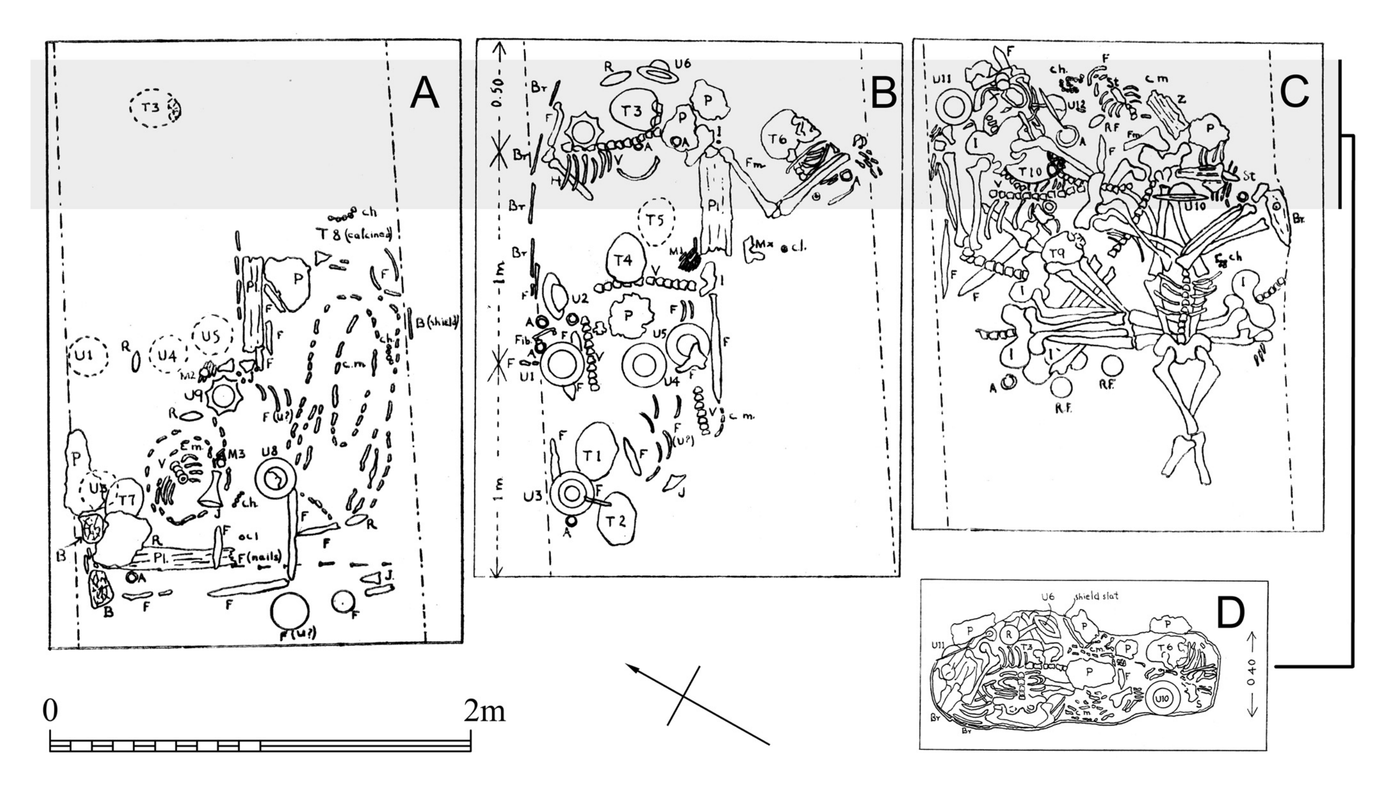


Figure 14 Tower 19 countermine, eastern part, plans and 'section'; North is approximate (based on *Rep*. VI, figs 17–18). The 'section' (D) is evidently a composite, as the numbered items which feature in it do not lie in a single vertical plane. The approximate location represented by the 'section' is indicated by the grey band. See Fig. 13 for key.

At the eastern end of the complex, adjacent to the Persian blocking wall, lay a body, stretched out on its back as though the man had fallen backwards while facing the town (Fig. 13). He was wearing a mail shirt with long sleeves (certainly **379**) and a small round copper alloy plaque as a pendant, now lost, round his neck (Fig. 52; *Rep*. VI, 193–4, fig. 16). The front hem of the shirt had been lifted, perhaps, as du Mesnil thought, by the wounded man in an effort to get it off (*Rep*. VI, 192), or more likely by an enemy to permit a thrust to the abdomen to despatch him.

Moving west, beyond the feet of the body (Fig. 13, top), lay a scatter of items on the floor, including a brooch, fragments of iron from what appears to be a shield and then a group consisting of a pitch-filled jar (which supplemented other incendiary materials in this part of the mine, including burnt straw, cloth and sulphur crystals), a sword with a jade pommel (**532**) and a remarkable iron helmet, which was believed to be Persian (**371**). The excavator concluded that these belonged to the individual discussed above (*Rep*. VI, 194).

Beyond the sword and helmet complex lay a grisly tangle of skeletons and fragments of equipment, which were estimated to be the remains of 'sixteen or eighteen soldiers' in a mass about 400 mm deep, and 2 m in length, filling the width of the tunnel. However, the drawings only show skulls numbered up to ten (plus the 'Persian'), and shield bosses numbered to twelve. These bodies were burned on the side towards the city wall, and were less damaged within the mass on the townward side. In my view, the bodies were deliberately thrown into a heap by the Persians as a barrier to impede further Roman intervention, and to clear the ground while they destroyed the Roman tunnel. The cloth fragments and brooches in the middle of the tunnel, found with burnt straw, could represent garments taken from the Roman dead to help start the countermine fire.

In his discussion of the objects discovered among the bodies, du Mesnil records that the iron was often too badly corroded to identify objects, but that they apparently included:

> parts of swords, perhaps also of a javelin, and portions of thin, curved plaques from leg guards (?) and bosses rather than from helmets. By good fortune, a large sword was preserved intact together with its pommel of rock crystal. The iron coats of mail, though found in fragments, were readily recognizable . . . The bronze objects consisted particularly of a shield boss [*sic*: the drawings and the archaeological remains suggest numerous copper alloy bosses; du Mesnil's French manuscript is ambiguous, but probably intends the plural here], rings of several sizes [belt rings and finger-rings?] small chains, undoubtedly used to fasten garments, and pierced ornamental plaques [surely belt fittings]. (*Rep*. VI, 195–7)

There were also 'pink-painted' wood fragments, from shields, and three groups of coins (*Rep*. VI, 470–5). One group lay under the mail of a body, against the thigh-bone (*Rep*. VI, 197), probably representing the contents of a purse attached to the belt, beneath the armour.

Tower 19 collapse deposits

Stratigraphically later than the mine group (although in the circumstances perhaps laid down only hours, or at most days, later) was the deposition of the items in the debris within Tower 19 itself. As with the mines beneath, no original site notes, drawings or photographs of the material *in situ* survive at Yale, so again we have to rely on the published account in *Rep*. VI and on du Mesnil's French typescript draft of the *Report*, preserved at Yale, which differ in significant respects. *Rep*. VI omits some details that appear in the du Mesnil typescript, but adds others. It evidently drew on other records or on the memories of other members of the expedition.

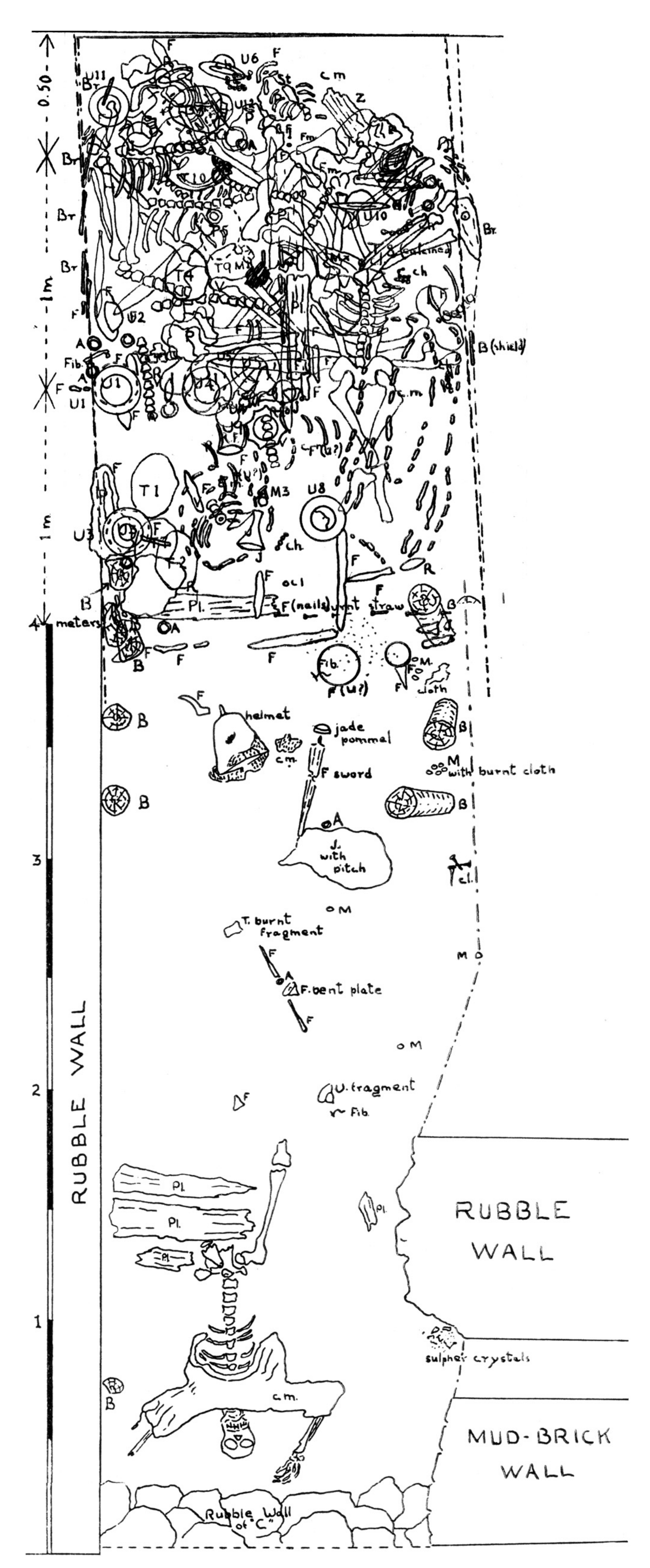


Figure 15 Composite reconstruction, at 1:30, of the Tower 19 countermine deposits through superimposition of drawings in *Rep*. VI, figs 16 and 18 (here Figs 13 and 14), with data from Du Mesnil 1944, fig. 4 (Fig. 12, *right*), showing a length of 4 m from the outer face of the mud-brick wall to just beyond the jade-pommel sword, and 2.5 m for the length of the pile of bodies. See Fig. 13 for key.

The firing of the mine beneath Tower 19 led, as we have seen, to its partial burning and collapse. While the upper part of the tower was extensively burnt, and many fire-damaged objects fell from above into the lower rooms (*Rep*. VI, 440), the contents of the lower rooms, trapped beneath the fallen upper floors and roof materials, were remarkably well preserved, in du Mesnil's view due to the lack of oxygen resulting from the earthworks which enveloped them (*Rep*. VI, 199, 438).



Figure 16 The stricken Tower 19 and the undermined section of curtain wall immediately to its north, seen from Wall Street in 2001. When the mine was fired, the tower and wall, supported by the glacis and earth rampart (now removed), sank vertically but stayed upright. The Roman countermine ran in from the left, intercepting the Persian sap at the junction of wall and tower.

Du Mesnil's original French manuscript for *Rep*. VI records that beneath a sterile upper layer:

> the middle layer produced only heavily burnt items, especially two armoured trappers [*sic*: now identified as one trapper, **451**, and two cuisses, **443** and **444**] one of imbricated copper scales, of which the textile or leather backing had vanished, the other of the same type, less burnt but nevertheless in very bad condition. These pieces were found in the western room of the tower, in the south-eastern corner at a level corresponding to the first floor.
>
> They were folded at the time of the fire. An arrowhead was still stuck in one of the scales which it had pierced. The *zone médiane* of the tower had again produced very numerous iron arrowheads . . .
>
> The lower part of the tower . . . produced priceless objects in an extraordinary state of preservation. One notes especially the two trappers, one of iron, the other of bronze . . . These armours were found in the eastern room of the tower, towards the north-western corner, at some metres below the ground. They were carefully folded, one on top of the other. [The] . . . *scutum* . . . we recovered from the lower part of the same room . . .
>
> The bottom part of the tower again produced a mass of bronze weapons, provided with points . . . arrowshafts with their fletching . . . (du Mesnil du Buisson, n.d., 30–1, my translation)

It was noted that all the major items appeared to be incomplete: the shield lacked its boss, the fragmentary housing III (**451**) had been pierced by a ballista bolt, etc. Perhaps they were stored in the tower awaiting repair (*Rep*. VI, 438). The shield was apparently close to or on the floor, the others perhaps on shelves or hung on the walls (*Rep*. VI, 439).

Table 3 presents du Mesnil's fairly detailed account, supplemented, in square brackets, by the additional information from *Rep*. VI with, so far as possible, identifications of particular objects in the present catalogue. (NB It is clear that the published accounts are not comprehensive: the provenance of the small armour fragment **398** is given as Tower 19, but it is not mentioned in the texts; other such small items may also have been found but not listed.)

Military finds in the lower rooms of other towers

Other towers also produced further groups of material, some too baldly described to be informative (e.g. Tower 14, below). These groups comprised:

Tower 1 ('Tower of the Palmyrene Gods'): 'in the bottom of this tower . . . [were found] fragments of painted shields, unfortunately in bad state, several lance-heads [probably from catapult bolts] and bronze coins' (*Rep*. II, 11). There is a noteworthy recurrent pattern of shields and other weapons in the lower rooms of the towers, which were apparently and unsurprisingly all in use as weapons stores and/or barracks at the time of the siege.

Tower 2 ('Tower of the Archers') was excavated by Cumont, who found fragments of shields (**621**, **622**, **623** and **630**), catapult bolts (**832**, **833**), a chape (**559**) and possibly a copper alloy bow-shaped fitting (**100**).

Tower 14 contained 'arms and armor' (*Rep*. V, 15).

Tower 15 produced from its lower rooms eighteen wooden catapult bolts and a 'painted shield' (*Rep*. IV, 10). None of these can now be identified. Other unspecified arms and armour were also found, but 'it was not possible to tell with certainty . . . which belonged to the ground floor and which to the fallen floor above' (*Rep*. V, 15).

Tower 16 contained two sizes of stone balls and a scale shirt 'from the northwest corner . . . which must have been hanging up in the tower . . .' (*Rep*. IV, 11; finds not identified).

The Palmyrene Gate: The entrance to the northern chambers produced shield **635** and two wooden catapult bolts, **815** and **831** (*Rep*. I, 16–18). The rooms themselves produced 'pieces of leather and painted shields', 'clothing and the remains of armour . . . many lance-heads [probably ballista bolt-heads] . . .' The rooms on the southern side produced antlers (for manufacturing?), 'clothing and leather from soldiers' boots, shod with large nails' (*Rep*. II, 7–8). Other items, **31**, **561** and perhaps **232**, also come from the gate, as did some artillery stones (*Rep*. II, 14).

Post-siege occupation

Dura was not immediately or totally deserted after it fell to the Persians. There is evidence of limited Sasanian occupation (Leriche and Mahmoud 1994, 417–19), and of Christian hermits living in the ruins in the fourth century AD (Breasted 1924, 48). Traces of some ninth-century AD occupation were recorded in the citadel (*Rep*. V, 1). Ammianus describes how the emperor Julian's army reached 'the deserted city of Dura' in AD 363, where they hunted the abundant deer with arrows (Ammianus 24.1.5). The latter reference in particular highlights the possibility that some of the pieces recovered from Dura may have been deposited later. Objects deposited on the surface, however, are unlikely to have survived, while there is little sign of later disturbance across most of the city apart from the exceptions noted. It is therefore unlikely that post-siege items entered the collection, except perhaps the odd arrowhead.

Supplementary sources for soldiers and warfare at Dura: visual representations

The range of representations at Dura

One of the most valuable sources supplementing the archaeological evidence for military equipment and warfare from the site comprises the considerable range of depictions of soldiers and other armed figures (e.g. horse archers hunting etc.; Fig. 17) found on the walls of buildings across the city. Many are seen in formal paintings from temples and houses, others are *dipinti* and graffiti (Goldman 1999b). Most seem to date from the latter decades of the city's life, during the Roman period and the last chaotic years. Most survive because they were entombed in the earth ramparts.

The significant depictions of soldiers from Dura are:

The Terentius painting

A painting showing an act of sacrifice from the *pronaos* of the Temple of Bel, also known as the Temple of the Palmyrene Gods (Plates 1 and 2, Figs 18 to 20). It is now at Yale (1931.386). The scene shows a figure (Fig. 19:G) offering incense to a group of deities (A to C) and personifications of the cities of Palmyra and Dura (D, E). He is labelled in Latin 'Julius Terentius, tribune'. Behind him are ranks of sword-armed, cloaked men. Their right hands are raised. One of these (M), who reaches out to the standard on the other side of the altar, is labelled in Greek 'Themes, son of Mocimus'. Both of the named men are independently attested as belonging to *cohors XX Palmyrenorum*, so it is assumed that the painting shows a sacrifice by soldiers of that unit, probably to the national deities of the city from which it was raised.

The painting was already damaged when it was found in 1920 (Breasted 1924, 75), and more details have been lost since, during the course of its reburial, removal to Yale, and early conservation treatment (Stout and Gettens 1932). As a consequence, no single, definitive image of it exists, although several have been published, including a crudely retouched colour version based on a bad negative and hasty notes literally made under battlefield conditions by Breasted (1922, pl. XLVIII). He also published an interpretative drawing furnished by Cumont (Breasted 1924, pl. XXI). Perhaps the best is Cumont's colour version, a watercolour reconstruction made in Paris (Plate 1; Cumont 1926, pl. L), but this contains some inaccuracies and lacks certain details, notably regarding what I interpret as faded patches of purple decoration on the tunics of Terentius and others. These are visible on *in situ* photographs taken in 1930, shortly before the painting was removed from the site (Fig. 20; *Rep*. IV, 18: their apparent whiteness appears to be due to the use of early non-panchromatic film emulsion which registered blue wavelengths as white).

The fine details of the soldiers' dress are discussed below (pp. 57–66). In general terms, they are shown in so-called camp dress, that is without armour or arms other than their swords. Each wears a belted, long-sleeved tunic over dark breeches, a sword on a shoulder-belt and a cloak, mostly brownish (those of Terentius himself and one other are white), draped in a uniform manner.

Dipinto from the Temple of Azzanathkona

A painted sketch from Room W14 in the Temple of Azzanathkona (Fig. 21; *Rep*. V, 153–4, pl. XXXVI) depicts an officer sacrificing to Iarhibol (shown with nimbus and radiate crown). It is now at Yale (1932.1208). The soldier has cross symbols on the thighs of his tunic, which seems to have a lower border and certainly a fringed lower edge, and sleeve rings. He wears a waist-belt, apparently a baldric, and a *sagum* seemingly folded back on the left shoulder. His left hand rests on his

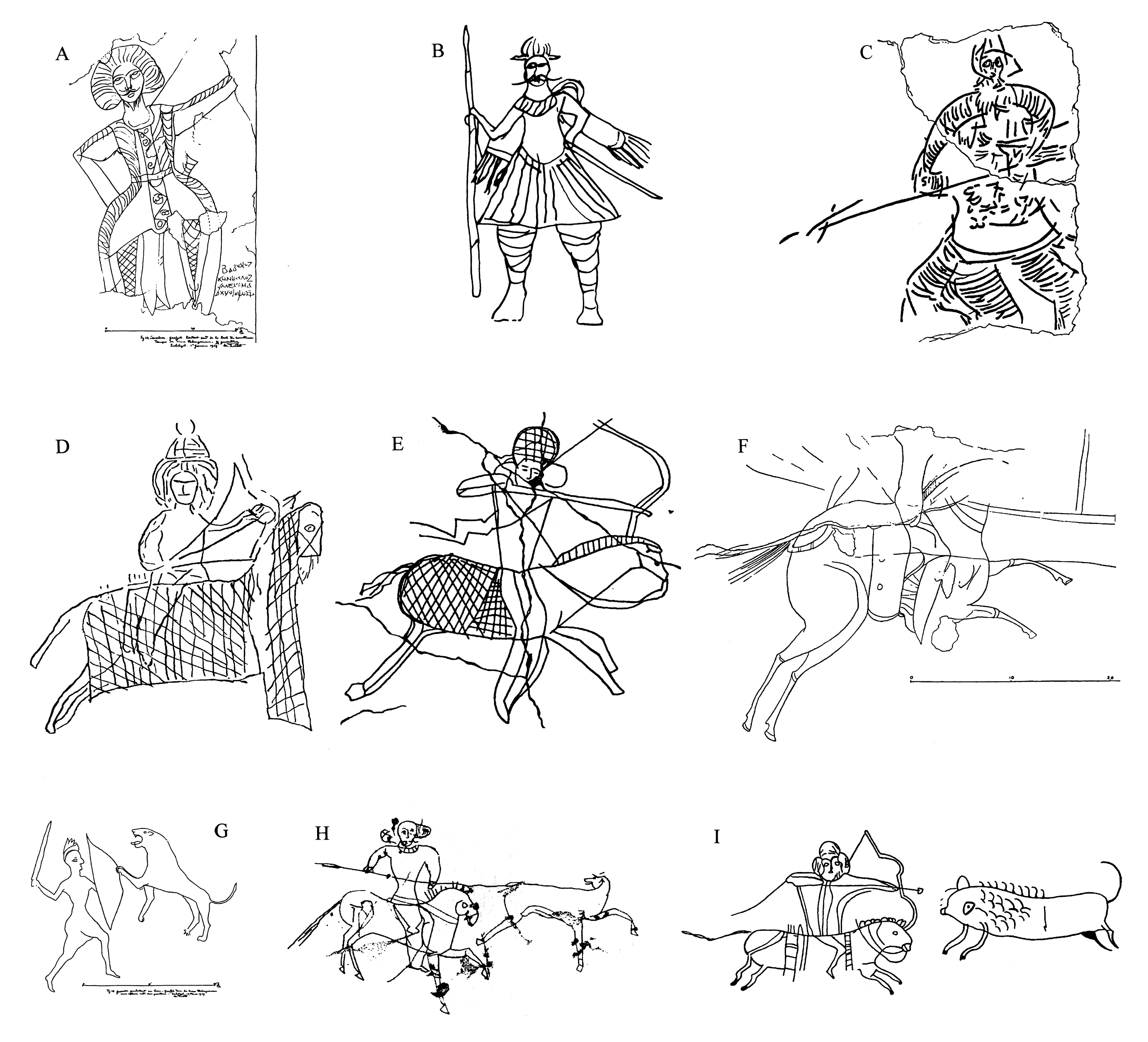


Figure 17 Graffiti from Dura representing male figures, armed and on horseback (see also Fig. 117).
A Figure in Iranian dress (after *Rep*. IV, pl. XX:2)
B Armed man (after *Rep*. II, pl. XLII:1)
C Man in armour? (after *Rep*. VI, fig. 8:a)
D Mounted archer on armoured horse (after *Rep*. IX.iii, fig. 6:a)
E Horse archer (after *Rep*. VI, fig. 22:a)
F Horse archer? (after *Rep*. II, pl. XLIII:2)
G Hunter on foot, tackling a lion (after *Rep*. II, pl. XLIII:1)
H Mounted huntsman spearing an antelope? (after *Rep*. IV, pl. XX:3)
I Horse archer shooting a lion (after *Rep*. VI, fig. 23)

sword-hilt. What seems to be a disc-shaped chape (scabbard terminal) appears behind his left knee. He is clearly wearing shoes.

The mural from the house in block E4

The remains of a mural from the house in block E4, room 23, show the legs of a figure very similar in pose to Terentius (not illustrated; *Rep*. VI, 21–2, pl. XL:4: the present location of this piece is unknown). This figure is apparently shoeless, the legs being painted a deep 'chocolate brown'. The curving, lower edge of a fringed cloak hangs behind the calves, coloured a 'brilliant light blue-violet, with fringes of orange-tan shaded with the thinned chocolate colour' (*Rep*. VI, 21). The dress, pose and action are so similar that this is probably another scene showing a Roman officer making sacrifice.

The portrait of Heliodorus, House of the Scribes

The best preserved of several blocks, originally ceiling panels, some with portraits of individuals: this example bears the name Heliodorus in Greek. He is described as an '*actouaris*' (Plate 3; *Rep*. VI, 291–2, no. 782, pl. XLIV:1). Now at Yale (1933.292). An *actarius* or *actuarius* was a senior regimental clerk. Heliodorus wears a white tunic with pink traces of an originally purplish trimming at the neck, and a yellow-brown cloak. 'There is a simple leaf pattern or a fringe in dark brown setting off the arm' (*Rep*. VI, 292). He holds what is probably a writing set.

Figure 18 The Terentius painting photographed *in situ* in the temple of Bel in 1930, immediately before its removal to Yale.

The synagogue murals

The famous cycle of third-century paintings in the synagogue has been more intensively studied than almost any other aspect of the Dura discoveries (Kraeling 1956; Gutman 1992; Goldman 1999a: currently displayed in the National Museum, Damascus). Several scenes include soldiers, but for reasons outlined below their value as testimony for the appearance of contemporary soldiers at Dura is highly questionable. The most informative image is the Battle of Eben-Ezer, with soldiers guarding the Ark of the Covenant in the left-hand scene and engaged in battle on the right (Plate 4). These images show foot-soldiers with long trousers and mail shirts which correspond well to the archaeological testimony from the city. The soldiers wear no helmets, but several appear to be wearing head-cloths. Two unarmoured horsemen charge each other with levelled lances in Iranian style; the horseman in the panel

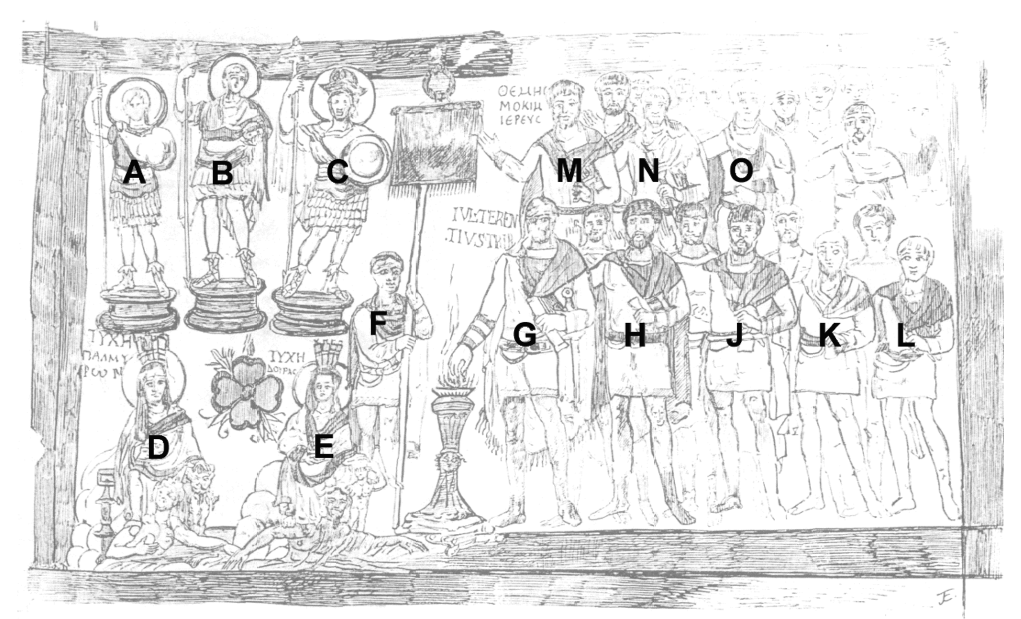


Figure 19 Terentius painting, Temple of Bel (after Breasted 1924, pl. XXI); the arrangement of human and divine figures:
A–C The Palmyrene gods
D The *Tyche* of Palmyra
E The *Tyche* of Dura
F–O Officers and men of *cohors XX Palmyrenorum*, including:
F The vexillarius
G Terentius the tribune
K Figure with non-standard uniform (white cloak, swastika-embellished tunic), and fair hair
M Themes the priest
N Figure with staff

Figure 20 Terentius painting, detail of the soldiers (photographed *in situ*, 1930).

depicting the story of Mordechai and Esther is likewise shown in Iranian costume, with quiver and bow case (Plate 5).

The Sasanian 'battle mural'

A large *dipinto* on the wall of the House of the Frescoes (block C7, house F, room 8) shows a scene of battle between mounted warriors in a style clearly related to that of early Sasanian royal reliefs (Fig. 22; *Rep.* IV, 182–206, pl. xviii; Goldman and Little 1980). It depicts a series of individual combats, in which charging lancers dressed in Iranian style overthrow their fleeing foes, all the mounts galloping to the right. The painting is labelled but the language, not to mention the readings, is a matter of dispute, although certainly Iranian (Goldman and Little 1980, 293). The scene is most plausibly to be associated with the brief Sasanian occupation of the city after the final siege. The clearest figure of a defeated enemy, with his sword, round shield and possibly skirted armour, is probably a Roman.

Other graffiti and *dipinti*

There are a number of interesting line drawings, scratched in plaster or painted, showing soldiers, warriors or huntsmen, mostly mounted, often horse archers (Figs 17, 117). These sketches include the famous 'charging *clibanarius*' (Fig. 23: Yale no. 1931.608).

Using the representational data: methodological problems

This range of representations clearly has potential for throwing light on the archaeological remains. It represents several formal artistic traditions, each with its own particular conventions,

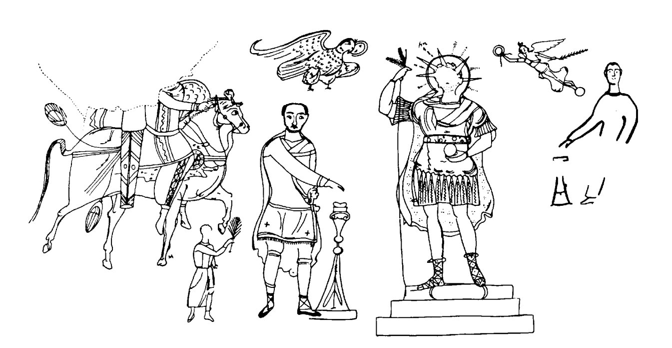


Figure 21 *Dipinto* of an officer sacrificing to Iarhibol, from the Temple of Azzanathkona.

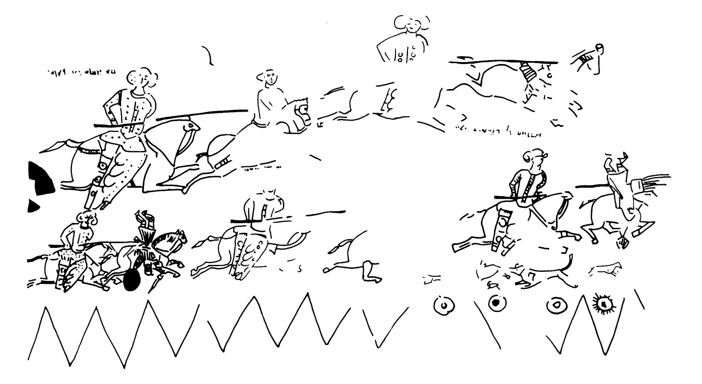


Figure 22 Sasanian 'battle mural' from the House of the Frescoes.

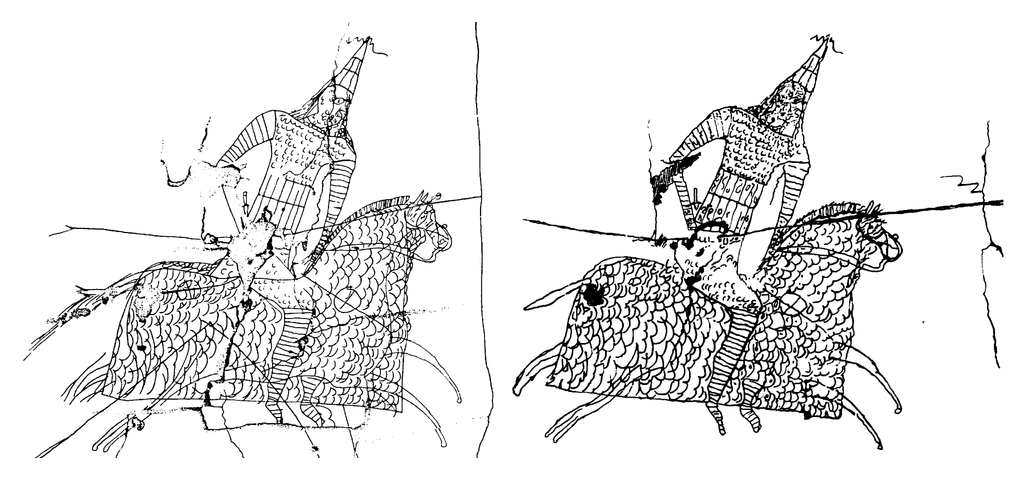


Figure 23 The famous '*clibanarius*' graffito: two slightly different renderings from the Yale archive.

plus the informal efforts of more or less skilled individuals. The Terentius and Heliodorus paintings demonstrate that Roman soldiers at Dura commissioned images employing the local artistic traditions of frontality. It is interesting that equestrian and battle scenes follow Iranian tradition. Some may actually have been executed by Sasanian soldiers, such as the battle mural. These considerations of convention and competence all create problems if, as in the present case, the question asked of these images is: what do they tell us about the actual appearance of Roman and other soldiers at Dura? In some cases – notably in the synagogue – accurate representation of soldiers was evidently not the primary concern of the artist(s), even if their art drew on what they saw on the streets of the city. How, then, should we make use of this important body of data?

It is now well established that representations have their own unique properties and limitations as sources of evidence for the past, especially for the actual appearance of people, places and actions. These depend on the context and purpose of their creation, who made them, and with what degree of competence. Some kinds of representation are more likely to exhibit care over the visual accuracy of details than others (for a general discussion of representations of Roman armour in particular, see Bishop and Coulston 1993, 19–32). With regard to competence, at Dura, for example, the highly specific and skilfully executed details of dress seen on the Terentius and Heliodorus paintings are both clearer to interpret, and (as portraits of named individuals) are more likely to correspond to visible reality than some of the rough and ambiguous strokes of certain graffiti. Further, particular transformations or 'distortions' of visual reality can result from the creation of images according to a particular tradition with its own visual language and clichés. In the general case of images of Roman soldiers, for example, few nowadays would take every detail of the military reliefs on Trajan's Column as a photographically accurate view of the appearance of the Roman army of the early second century AD (Lepper and Frere 1988, 266–8): it is clear that, consciously or unconsciously, the depictions are affected by the conventions of Hellenistic art and by the fact that the Column was carved by sculptors not entirely familiar with some of the subject matter (for a discussion of the problems, see Coulston 1989). It is generally agreed that the most trustworthy representations of Roman soldiers are those made by the army itself, or by people in direct contact with it, rather than those of artists trained in the repertoire and style of metropolitan Rome (Waurick 1980).

However, such problems are not intractable. Some general guidance on the value of particular representations for the present purpose may be gained from a consideration of their context: for what purpose were they created, and by whom? It is also often possible to cross-check and corroborate details of such visual information against other representations from elsewhere, and often against the archaeology.

For example, if our aim is to investigate the appearance of Roman soldiers on the streets of Dura, there are good reasons for giving greater general credence to the visual information of the Terentius paintings than those of the synagogue, on grounds of context and purpose. The Terentius scene is apparently intended to commemorate an actual event in the lives of a group of soldiers, a sacrifice before the Palmyrene gods, which may be presumed to have taken place in the temple where the painting was created. This was itself in the Roman military cantonment, and thus was frequented by soldiers. The painting was surely commissioned by soldiers (probably by the tribune Terentius himself) and was created under soldiers' eyes: it may have been painted by a soldier. It therefore probably depicts them as they wished to be seen in their own social and professional context. Of course, this is still likely to involve some degree of idealization and the application of elements of a stylistic repertoire (the painting clearly follows the local tradition of frontality).

The synagogue murals, on the other hand, were never intended to depict contemporary scenes but evoked religious episodes of the distant past; the soldiers represented are not Romans or Partho-Sasanians but Israelites, Egyptians and Achaemenid Persians. Furthermore, these are represented through visual imagery which was itself traditionally foreign to Judaism. The sources used seem to have been eclectic (Kraeling 1956; Gutman 1992), apparently drawing standardized 'visual clichés' from sources such as Greek illustrated manuscripts and pattern books (Goldman 1992, 74). The soldiers in one of the Ezekiel scenes, for example, with their muscle cuirasses and crested helmets are clichés drawn from the Hellenistic artistic tradition (panel NC1, section C: Kraeling 1956, pl. LXXII). In others, there is clearly Iranian influence, particularly in the depiction of horsemen (Figs 17:A and 117:A). Some other details are indeed striking, and in my opinion were probably drawn

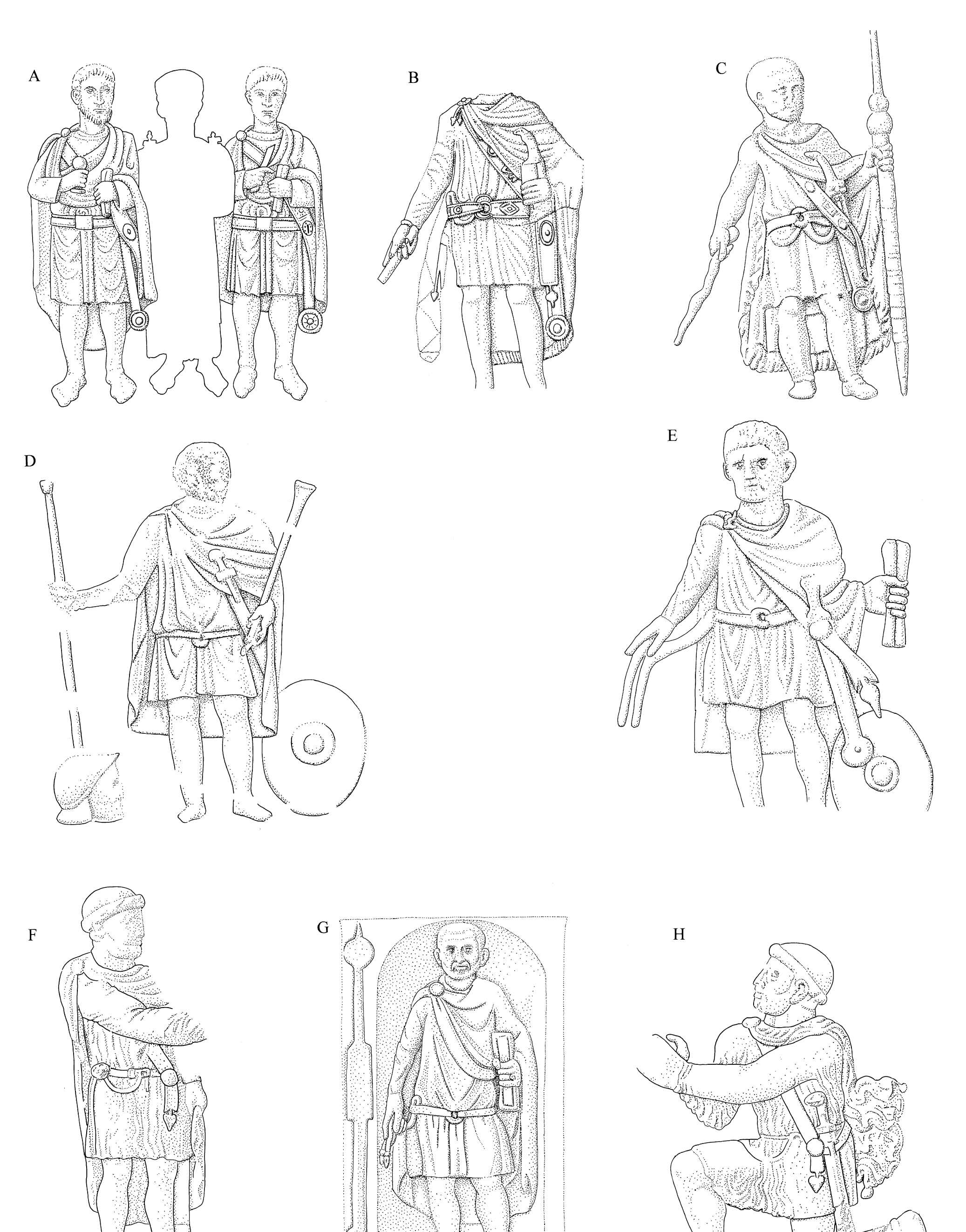
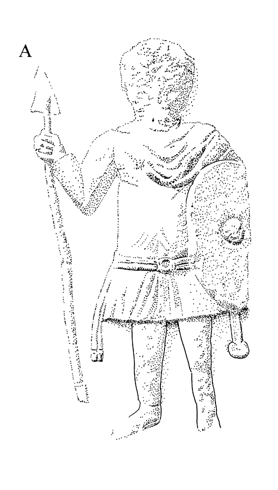


Figure 24 Third-century representations of figures in Roman military uniform:
A From the tomb of M. Cocceius Superanus, Danube (after Oldenstein 1976)
B Unknown, Rome (after Bishop and Coulston 1993)
C Tombstone of M. Aurelius Lucianus, Rome (after Bishop and Coulston 1993)
D Stela of Aurelius Surus, *bucinator* of *legio I Adiutrix* (Istanbul Museum)
E Unknown, holding strap ends, funerary relief, from Herakleia-Perinthos, (Istanbul Museum)
F Sasanian relief depicting Roman emperor, probably Valerian, Bishapur II (after Herrmann 1983)
G Damianus, *beneficiarius*, from Alexandria, Egypt (Museo Civico, Bologna)
H Sasanian relief depicting Roman emperor, probably Philip, Bishapur II (after Herrmann 1983)

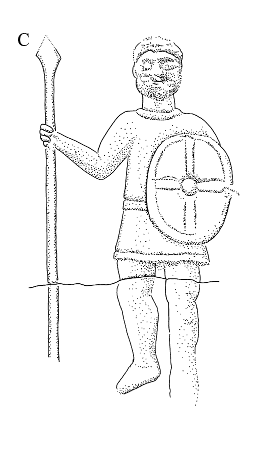
from observation of contemporary Roman soldiers in the streets outside, notably the long tight trousers and long-sleeved mail coats depicted in the battle of Eben-Ezer scene (Plate 4). These are quite foreign to the mainstream Graeco-Roman artistic tradition. The problem with these images is deciding which details are drawn from contemporary observation. Contextual consideration of this testimony suggests that it must be used with the utmost caution.

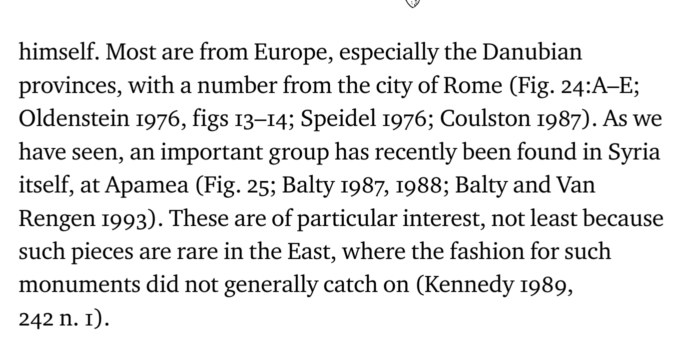
Further progress can be made through comparison with other images from elsewhere, to see what information is repeated within, and also across, artistic traditions. Of course, consistencies may simply show consistency of conventions, but some details – a highly pertinent example is the nature and conformation of Roman military dress – are so clear and precise and so frequently repeated that correspondence with visual reality is overwhelmingly likely. These complementary sources come from both the Roman and the Partho-Sasanian world, from Britain to Iran.

For the third century, there is relatively little relevant metropolitan monumental sculpture, apart from the Arch of Severus in the forum at Rome. However, the military reliefs on the arch are much less detailed than those of Trajan's Column and are apparently quite highly stylized; their details do not correspond very closely to the contemporary archaeological testimony, so they are not considered further here. Far more important are the numerous Roman military tombstones of the first half of the third century, showing full-length portraits of the deceased, often highly detailed with painstaking representations of clothing and other equipment, sometimes including armour. Indeed, emphasis on certain details of equipment often seems to have been more important than concern for the proportions of the figure of the deceased









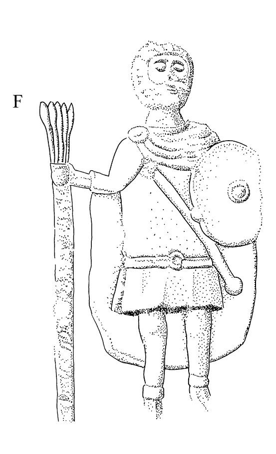


Figure 25 Representations of soldiers of *legio II Parthica* on tombstones from Apamea (after Balty 1987; Balty and Van Rengen 1993):

- A Aurelius Moucianos. (NB a different individual from F.) Note the pendant double strap ends.
- B Felsonius Verus, *aquilifer leg(ionis)*. The eagle is apparently in a protective 'cage'.
- C Fl. Trypho.
- D Verinius Marinus, *librarius officii legati legionis* shown with a document (?) container in his left hand, and displaying the strap end of his waistbelt in his right.
- E Petronius Proculus, *b(ene)f(iciarius) tr(ibuni) leg(ionis)*. The 'spear' is apparently an elaborate staff of office.
- F Aurelius Mucianus, *discens lanchiar(um)* (*lanciarius* in training) of *legio II Parthica*. Note the handful of javelins.

himself. Most are from Europe, especially the Danubian provinces, with a number from the city of Rome (Fig. 24:A–E; Oldenstein 1976, figs 13–14; Speidel 1976; Coulston 1987). As we have seen, an important group has recently been found in Syria itself, at Apamea (Fig. 25; Balty 1987, 1988; Balty and Van Rengen 1993). These are of particular interest, not least because such pieces are rare in the East, where the fashion for such monuments did not generally catch on (Kennedy 1989, 242 n. 1).

We also possess a valuable corpus of relevant material from other, Eastern traditions, not least from Iran which preserves some extraordinary Sasanian rock-carvings portraying the Shahs at their investiture, and especially at war or commemorating triumphs over Roman enemies (Hermann 2000; e.g. Bishapur: Herrmann 1980, 1981). There is also sculptural evidence from Palmyra, Hatra and other sites in the East (Fig. 26). Such sources of course provide highly valuable testimony for Eastern traditions of dress and armament, though they are harder to corroborate than Roman representations because of the shortage of relevant archaeological testimony with which to compare them. It is evident that these Eastern representations were also subject to artistic conventions, both of locally derived traditions and of imported ones. Palmyrene art, for instance, is extensively Hellenized, but also widely employs oriental hierarchy and frontality in composition (Colledge 1976).

Sasanian art is also highly formalized, which may compromise the reliability of carvings and paintings as sources of information on arms (Ghirshman 1962; Herrmann 1977). However, the Sasanian royal reliefs are especially interesting to the student of the Roman army, since they include a number of representations of Roman soldiers and emperors in military dress (Fig. 24:F and G). The details of uniform, belts and sword fittings of the three Roman emperors depicted with Shapur at Bishapur correspond in detail to those seen on Roman depictions, such as the contemporary tombstones and the Terentius painting (Fig. 24:H; Bishapur relief II: Herrmann 1977, 93 top, 96; Herrmann 1983, pls 12–13). It should be noted, however, that this may not be entirely independent testimony; it is possible that captive Roman provincial artists may have been involved in creating the images, as they were apparently involved in royal building at Ctesiphon and Bishapur (Garsoïan 1983, 581).

We can directly test the visual veracity of at least some aspects of all these depictions by looking at how they represent items attested archaeologically (notably Roman material such as swords and belt-fittings, and to some extent footwear and garments).

When tested in this way, the accuracy of detail of the Terentius and Heliodorus paintings at Dura, Roman military tombstones and Sasanian rock reliefs often proves remarkable. Both Roman and Sasanian representations seem to reproduce visual reality faithfully in these regards. This cross-check also encourages me to trust the details of Sasanian weaponry shown on the reliefs, even though we have as yet virtually no archaeologically proven third-century Sasanian weapons outside the handful from Dura described in this volume.

In conclusion, we can say with confidence that some of the representations from Dura – notably the Terentius and Heliodorus paintings – do faithfully reproduce the visual

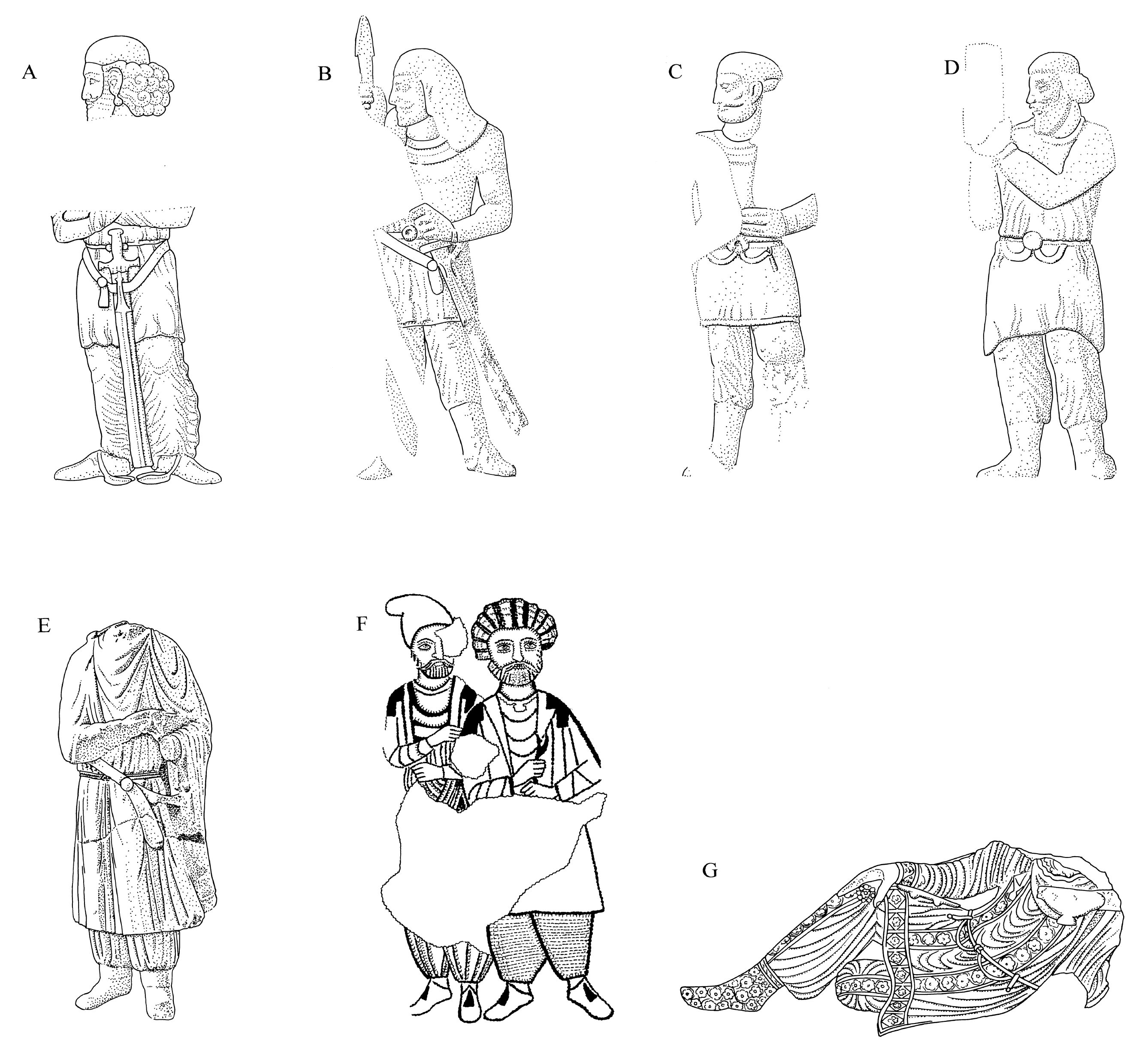


Figure 26 Middle Eastern male costume of the early centuries AD:
A Iranian noble, Bishapur IV (after Herrmann 1981, fig. 1, pls 1 and 5).
B Figure of a warrior from the Sasanian empire wearing a headcloth: from the Bishapur II relief, lower register, right, group 1 (after Herrmann 1983, pl. 16).
C Figure of a vassal nobleman (?) from the Sasanian empire, Bishapur II, lower register, right, group 2 (after Herrmann 1983, pl. 16).
D Figure of a vassal nobleman (?) from the Sasanian empire, Bishapur II, lower register, right, group 3 (after Herrmann 1983, pl. 17).
E Statue from Carrhae, showing sword belt around the waist, with mount and hanging end. Note also cloak (*chlamys*? *sagum*?) fastened at right shoulder (after Segal 1970, pl. 13b).
F Figures from family portrait mosaic, Edessa (after Segal 1970, pl. 1).
G Palmyrene in Iranian-style dress of long-sleeved tunic, baggy trousers, with cloak. Note swagged belt with pendant strap ends (after Seyrig 1937, fig. 10).

appearance of soldiers in the city. These may be used alongside other contemporary sources – especially Roman tombstones and Sasanian royal reliefs – to help us interpret the martial material culture from Dura. Others, especially the synagogue murals, are too ambiguous to use without great circumspection, because contemporary reality was not their only or even principal source, and its representation was not their purpose. The informal graffiti and *dipinti* from Dura must also be treated with extreme caution, with their literally sketchy detail remaining highly ambiguous.

Part 2

The assemblage

Military dress and horse harness

Military dress and horse harness are considered together, since much of the archaeological evidence for both consists of isolated metal fittings which both structural detail and parallels suggest are from leather straps. They are components of larger composite artefacts (e.g. belts, baldrics, bridles), although whether from human dress or horse harness is not always apparent. Some items were probably used on both interchangeably, especially simple studs. The conditions at Dura also preserved remains from other, less ambiguous categories, such as footwear (Kaplan 1971) and a quantity of textile remains, some of which may be from military dress (Pfister and Bellinger 1945). The overwhelming majority of the Dura material is of known Roman types.

A key problem in attempting a study of these categories is the uncertainty of the military attribution of many of the pieces, arising from our ignorance of the boundary between military and civilian artefacts, and the likelihood that it was often vague: so, for example, both civilian females and soldiers may have worn ivy-leaf pendants for different reasons, while civilian and military horse harness may well have been largely indistinguishable. Of course, many of the items recovered from the site were probably in civilian use. I have erred on the side of inclusiveness in many cases, but many uninformative and ambiguous items preserved at Yale have been omitted, such as the bulk of the plain bone rings and most of the 100 bronze rings and discs which may or may not be from military equipment: plain metal rings were certainly used on horse harness, as seen, for example, in the Brigetio horse burials (Barkóczi 1948, 177, pl. XXX).

Specific functional identifications made here are often tentative and provisional. Identification of items from Dura as surely or probably military rests partly on excavated contexts where these are known, but mostly on comparative material from elsewhere, which may have more informative contexts. The rich record of contemporaneous representations, in particular of soldiers, from Dura and elsewhere is fundamental to interpretation of this material.

The artefact record

Fittings identified as belonging to military dress and horse harness include cloak-brooches (Fig. 29) and a wide variety of buckles, studs, plates, pendants, strap junctions and other items originally attached to belts, straps and equestrian tack. These are mostly of metal, but bone and ivory also appear. The great bulk of these are types known from other Roman provinces, from specifically military contexts. However, it is increasingly clear that by this period, and apparently long before, forts were thronged with women and children, soldiers' dependants, servants, slaves and other civilians (Maxfield 1995).

Concentration of certain object types at military rather than at civilian sites is suggestive, but more certain identification of objects as belonging to specifically soldierly equipment additionally demands detailed contextual associations (e.g. complete belt-sets) and/or corroboration from detailed representations (on tombstones etc.).

These are very important categories of objects because of their relative abundance and the fact that they were partly decorative in purpose, and thus exhibit stylistic traits of embellishment which are believed to have arisen in particular areas of the empire. Their distribution may reveal something of the connections between units and provincial armies.

Context and chronology of the Dura dress and harness fittings

Hardly any of the fittings under discussion comes from a context recorded in any detail. Some brooches and 'pierced ornamental plaques' (probably from belts or baldrics) were found in the Tower 19 mine, but it is not now possible to be sure which (*Rep*. VI, 194, 197). The lack of any provenance for most, and the lack of stratigraphic information even for those with a recorded findspot, means that the entire collection is, in effect, unstratified. It may be argued that the balance of probability is that much of the assemblage would have been laid down during or immediately after the siege, but many items, especially very small ones, could have been deposited at any time during the military occupation. There also remains the possibility that some, even if correctly identified as Roman types, may have reached the city before AD 165. A good example is provided by the Aucissa brooches (Frisch and Toll 1949, nos 6–16) which may have arrived through the mechanism of the Palmyrene presence in the city; Palmyrenes seem to have adopted aspects of Roman equipment from early imperial times onwards. Further, though rather limited, assistance with chronology is available from the mass of parallel material known from Europe.

Empire-wide trends in the development of Roman military equipment are quite well understood in outline (Bishop and Coulston 1993). In the Antonine period there had been a complete revolution in the design and decoration of equipment fittings, establishing as standard throughout the empire the repertoire known from Dura (Bishop and Coulston 1993, 119). These styles remained in use until the later third century, if not beyond, when the huge military disruptions of the period led to a further round of changes.

The detailed chronology of the development and use of middle imperial types is less clear, since most of the known pieces come from chance finds or early excavations, and thus lack datable stratigraphic contexts. Oldenstein's (1976) study of the material from the auxiliary forts of the Upper German *limes* is the most valuable comparative collection of data. Here broad dating horizons have been established from the dates of foundation, and especially of abandonment, for particular sites. For example, the forts of the '*vordere Limeslinie*' were

established in the mid-second century AD, while Holzhausen and Niederbieber were only established *c*.180–90. These forts were then abandoned at various dates from AD 235 to 260 (Oldenstein 1976, 61). It is thought that little military equipment was incorporated into the archaeological record in normal times: metal from broken equipment was apparently collected and recycled (Bishop and Coulston 1993, 35). Deposition of significant quantities, apart from a limited number of grave groups, is a sign of disruption. Most of the material, therefore, may be expected to belong to the last phase of the forts in the mid-third century (Oldenstein 1976, 64, 67). We have, then, relatively few closely dated individual finds, but a fairly clear cumulative picture of the chronology of this range of material, which is now quite well understood and, in general terms, is seen to have been standard from Scotland to at least the Middle Danube. The Lower Danube seems to exhibit much the same repertoire, though it is less thoroughly attested there. This body of data provides the principal starting point for interpretation of the evidently related assemblage from Dura.

Materials, design and manufacture

Roman military fittings of the era shared a fairly standard common repertoire of materials, techniques of manufacture, and decorative motifs, itself known to be closely related to contemporary civilian production in many European provinces. Its relation to contemporary local production in other areas, not least the East, is as yet inadequately explored.

Materials

Most surviving pieces are of copper alloy, although some are apparently of silver (**17**, **51**, **114**, **158**, **215**). Iron seems to have been little used, if not avoided altogether, for personal dress fittings. The only decorated iron buckle is of non-Roman type (**71**); plain iron buckles could well be from horse harness or other non-dress uses, so it seems likely that iron was avoided for dress fittings at Dura. For comparison, only *c*.1% of around three thousand brooches excavated at Augst are iron, almost 99% are copper alloy, and barely 0.2% are silver (Riha 1994, 17). Iron items are probably under-represented because of differential corrosion, but the preponderance of non-ferrous items can only partly be explained in this way; it surely reflects an original disparity, the result of deliberate choices. Some may have been simply practical: sweat-induced rusting would stain garments. However, these choices were probably made at least in part for non-functional reasons. Iron finger-rings were worn at Dura, and may have been thought lucky in that specific context (Italians touch iron for luck today: see **382**, where good fortune proved elusive).

Fittings were not universally of metal; there are some bone and ivory buckles and strap terminals surely from military belts (**53**, **179** to **188**). Ivory was a luxury material used in particular on sword fittings (**573**; see also the ivory scabbard on the Khisfine sword, Syria: Trousdale 1975, no. S1 and pl. 19a and b; Gogräfe and Chehadé 1999, 74–7, and figs 2–4).

Techniques of manufacture

Some metal fittings were cut from hammered plate but most were cast, with some filing and other reworking and finishing (Frisch and Toll 1949, 1). Many, notably buckles, were assembled from several riveted components. Many castings were probably made by the lost wax technique; others could have come from two-piece reusable moulds. The fragment of a clay mould for a seal-box seems not to be an incompetent attempt at making a bipartite mould as Frisch and Toll aver, but is part of a lost wax mould (Frisch and Toll 1949, 43, enamelled bronze no. 35, pl. IX).

Bone and ivory pieces were produced by knife-carving, and probably by sawing, drilling and lathe-turning. They were polished and attached to leather by metal rivets.

Embellishment

Decoration on metal fittings was often moulded integrally (e.g. the openwork mounts), or applied afterwards, especially on sheet components. It varied greatly in skill and complexity, from crude knife- or chisel-cuts to punched patterns of dots, crescents, ring-and-dot motifs, inscribed lines and circles, and simple repoussé. There is little evidence of more sophisticated engraving.

Fittings **151** and possibly **158** seem to show signs of tinning or silvering, perhaps intended both to imitate richer objects and to resist corrosion. White-metal plating often appears on Upper German finds, and may have been far more common at Dura than now appears, unnoticed because of extensive corrosion products still present on some pieces, excessive archaeological cleaning of others, and a lack of metallurgical examination.

The inlaying of contrasting metal and niello seen on early imperial equipment is not known from Dura, but ‘enamelling’, or inlays of brightly coloured patches of plain or millefiore glass, was quite common on strap fittings (**90**, **192**, **295**, **321** and probably **89**) and brooches (Fig. 29:F; Frisch and Toll 1949, 35–6, enamelled bronzes 17–29; Bateson 1981).

Motifs

Strap/belt fittings and brooches exhibit a great variety of minor variants on a fairly limited and consistent range of decorative motifs, used singly or in compositions of varying degrees of elaboration (Frisch and Toll 1949, 2–7). Apart from simple geometric forms (lines, circles, ring-and-dot patterns, swastikas, and rectilinear apertures and lattices), two major influences are apparent on numerous pieces: plastic ornament of La Tène (‘Celtic’) inspiration and classical motifs. The major classical elements comprise the crescent (some with ball-terminals), ivy-leaf, *pelta*, and tendrils.

Various more individualistic elements and motifs also appear. One piece incorporates a letter of the alphabet, which parallels reveal to be part of an invocation of good fortune (**78**). There is also a range of brooches in the form of the letter ‘S’, and some stylized equivalents (Frisch and Toll 1949, fibulae 126–36). Many elements are certainly or probably representational, of artefacts, animals (not least on brooches) and human (or, in the case of **189**, anthropomorphic) body parts. Some are quite naturalistic, others heavily stylized, as the following examples illustrate:

Shield	**1** etc.
Sword	**146** etc.
Bow	**100**, **101**
Axe	Frisch and Toll 1949, fibulae 157–9
Wheel (?)	**19**, **348**
Dolphin	**80**, Frisch and Toll 1949, fibulae 25–30

Dog with a hare	**77**
Horse	Frisch and Toll 1949, fibula 166
Eagle	Frisch and Toll 1949, fibulae 160–2
Silenus face	**189**
Phallus	**357** etc.
Vulva	**285?**, **302**, **303**

Symbols and symbolism

Did such decorative motifs convey any particular meanings? Many had probably become simple decoration with no particular significance. At most, some (such as, perhaps, the ubiquitous ivy-leaf and *pelta*) may have indicated adherence to Graeco-Roman cultural values in a general way. Others may have had vague associations with martial qualities and belief systems. Some may have been highly specific.

Lunulae, apparently originally worn by women, were worn by both sexes in the Roman world, and came to be used extensively on military equipment, notably horse harness (Zadoks-Josephus Jitta and Witteween 1977, 171–4). The local pattern of use at Dura is unclear, but inspection of broadly contemporary Palmyrene funerary sculpture suggests that there, at least, the *lunula* was worn almost exclusively by women, on necklaces; it appears on only a single male, perhaps significantly a youth rather than an adult (Tanabe 1986, no. 262). Some of the 'lunate' pendants from Dura have bulbous terminals (e.g. **193**, **195**). These may originally have represented stylized torcs, such as had been painted on shields and given as military awards in the early imperial period. Perhaps the significance of the symbol had gradually been forgotten, and it had become simply a variant of the moon motif.

A number of the Dura fittings are miniature representations of weapons and other military items, including composite bows (**100**, **101**), apparently sheathed swords (**137**, **138**, **141** to **146**) and shields (**321**: note also the similarity of design between baldric fastener **20** and the painting on the back of shield **617**). Were these simply decorative examples of generally suitable martial motifs, or did any of them have specific meanings?

Fittings (both pendants and plates intended for attachment to leather straps) in the form of swords are well known among the carefully documented material from Upper Germany, and often seem specifically to represent the ring-pommelled sword, or *Ringknaufschwert*. Similar pieces represent stylized spear-heads with apertures in the blade, from well-known types of the so-called *beneficiarius* lances (other shapes were apparently known; see Fig. 25:E). Oldenstein has suggested these were badges worn only by a specific group of people, and symbolized particular powers (Oldenstein 1976, 152–5). '*Beneficiarius* lances', with their elaborate heads, were in fact also carried by other officials (Bishop and Coulston 1993, 126; for a silver brooch from Mainz representing both a '*Beneficiarius* lance' and *Ringknaufschwerter*, see Klein 1999, 90, abb. 10).

Examples and representations of so-called *beneficiarius* lances are known from northern Europe to the Mediterranean and Egypt (for detailed discussion see Fader-Feytmans 1980, Eibl 1994, and for a further find from Neupotz, Germany, see Künzl 1993, 89–93, no. C1). They were a special symbolic weapon providing a clear visual expression of the police-like powers of the bearers (for an example from Wiesbaden, see Bishop and Coulston 1993, fig. 84:13). Such officials have left graffiti recording their presence in the Palmyrene Gate at Dura (*beneficiarii* on altar no. 1: *Rep*. I, 20–1, 42; on Palmyrene Gate: *Rep*. I, 32–41:R1–3, R6, R14; *statores*: *Rep*. I, 36–8:R8a, R19, R11, R14). It is interesting to find the lance-heads represented on a silver brooch from Mainz (Klein 1999, 90, abb. 10) and belt fittings from Upper Germany (Oldenstein 1976, nos 366–81) and elsewhere: an openwork baldric plate from Silchester (Boon 1974, fig. 8:4) has a '*beneficiarius* lance' device in the centre, while the Chichester belt-set includes a fitting perhaps representing the same thing (Down and Rule 1971, 117, fig. 5.18).

A common characteristic of these badges of office is a horizontal pair of circular holes in the blade, perhaps the key symbolic element visually identifying such officials, at least in particular provinces. A very curious and highly decorated copper alloy 'standard', consisting of two large metal rings with a shaft-socket, was found in the Balkans (now in the Musée de l'Armée, Paris, *Rep*. IX.i 197, pl. XXIV:4). It might be another form of staff symbolic of a *beneficiarius* or similar official. A similar motif, a shaft bearing a squarish plate with two circular apertures, is depicted along with a sword and spear on the probably third-century tombstone of Aurelius Maximianus, a *miles* of *legio VIII Augusta* and former *beneficiarius*, found at Martigny (Nelis-Clément *et al*. 1996, 274, 282–3, fig. 3). Dress fittings exist which reproduce the shape of these 'two ring' staffs, e.g. baldric fasteners from Germany (Oldenstein 1976, nos 385–7: see also no. 363). It is suggested that an odd enamelled double-circle brooch from Dura conveys the same symbolism, and may be a badge of office (Fig. 29:F; Frisch and Toll 1949, enamelled bronze 29).

Perhaps the sword-shaped pendants were badges worn by officials of the governor who did not carry the '*beneficiarius*' lance (Oldenstein 1976, 152–5). These particular types seem to be specific to Upper Germany, but if Oldenstein is right, perhaps each province had specific ways of demarcating such personnel. It is interesting to note that the apparently sword-shaped pendants from Dura, if correctly identified, represent weapons with box chapes, a type apparently absent from the excavated examples of swords at Dura, suggesting that this form of sword and scabbard had become a visual convention, perhaps conveying a specific meaning, and was not necessarily a direct representation of actual weapons borne at the site.

The swastika, seen on brooches and baldric fasteners and elsewhere on military dress, may also have had a special significance, discussed below (p. 60).

A few apparently apotropaic examples are known, all of which are believed to be from horse harness rather than dress: the 'coffee-bean' (vulva) motif on some studs (**285**, **302**) and some phallic pendants (**357** to **360**).

Less ambiguous is the fragment of a *FELIX VTERE* belt-set (**78**), a complete example of which is known from Lyons (Wuilleumier 1950, fig. 1; Bishop and Coulston 1993, fig. 92). This message, 'use with good fortune', is quite often encountered on items of military equipment, although interestingly, so far as I am aware, only on items actually worn on the body: it is seen on belt plates, strap ends (South Shields: Allason-Jones and Miket 1984, 3.726; *RIB* II, 2429.11–16), and a possible dagger scabbard plate (Vindonissa: Unz and Deschler-Erb 1997, no. 2317). It is also seen on brooches (*RIB* II, 2421.56–8). A specific prayer for divine protection is encountered on certain elaborate baldric mounts: *optime maxime con(serva)* [baldric fastener]/*numerum omnium*

[terminal plate]/*militantium* [pendant], translated as 'best (and) greatest protect (us) a troop of fighting men all' (Allason-Jones 1986, 69). No such pieces were found at Dura, although they were known in the East (see below).

Axe and eagle brooches (Frisch and Toll 1949, e.g. fibulae 159–62) may also refer specifically to Jupiter cults, not least that of Jupiter Dolichenus, a widespread military cult of Eastern origin which had a shrine at Dura (*Rep*. IX.iii, 97–134). Indeed the eagle was also a common religious symbol in the East, not least at Palmyra (Colledge 1976, pls 12, 47), and at Dura (e.g. in the Dolicheneum, *Rep*. IX.iii, 128, pls XXIII:1, XXIV).

More generally, there seem to be some interesting distinctions within the military context at Dura, and perhaps elsewhere in the third century, regarding the symbols appropriate to men as opposed to those suitable for horses. For example, overtly sexual symbols, believed to be apotropaic, were apparently confined to horse furniture. Similarly, while *peltae* seem to occur everywhere, *lunulae* were evidently used on equestrian equipment and on scabbard slides (Fig. 24:C), but do not seem to have been employed on items worn directly on the human body. Could this have been a matter of gender, the *lunula* being regarded as inappropriately feminine? Details of dress seen on the funerary sculpture from Palmyra are consistent with such a general belief in the region.

The wider symbolic meanings of the composite belts of which many such fittings were components, and of the entire military clothing ensemble, are discussed below.

Forms, functions and combinations

Dura has produced little direct evidence for the original associations and combinations of all the different types of fittings: no associated belt-sets survive, beyond a pair of terminals, **159**, apparently found with a suspension ring, **113**, which might be part of such a set. A small group of decorative mounts probably came from the same strap, most likely part of a bridle (**353**). A large group of ivy-leaf pendants, found at E7-W9, may be from a single object, perhaps the breast strap from a saddle harness, although the attachment loops are not especially strong (large pendant, **201**; medium, all the same size: **207**, **208**, **209**, **210**, **211** and **212**; plus the smaller **214**); they share the same recorded provenance as a strap stud (**316**), and a pendant of a type known to have been used on horse harness (**158**). All others seem to be individual finds, most of which belong to the following, fairly well understood, categories.

Baldric fasteners

The sword-belt was held together by a metal fastener, in a manner described below (p. 62). Two major types are represented: broad, thin plates which certainly or probably represent shields in miniature (**1–11**) and generally thicker, openwork pieces (**17–29**).

The shield-shaped baldric fasteners clearly represent both the longish oval shield of the second century AD and earlier, and the more nearly circular forms actually found at Dura. It is hard to find exact parallels, especially for the longer oval type, but one may possibly be seen on a tombstone (Fig. 24:B).

Openwork forms are paralleled in Europe in general terms; roughly circular fasteners are quite well known. The splendid silver example **17** is strongly reminiscent of some very fine openwork fasteners known from Europe and Africa, which form part of sets of baldric mounts including a matching terminal plate with a hinged ivy-leaf pendant. The text of the standard prayer discussed above is worked into the design of many of these, from which they are referred to as *optime maxime* sets. Components are known from Britain to the Danube (Allason-Jones 1986; Petculescu 1991; Bishop and Coulston 1993, 135) and from the East (an eagle *phalera* from Nineveh, British Museum, WAA 1930-5-8,133; L. Allason-Jones pers. comm.).

No examples with a central eagle surrounded by text were identified at Dura, but it is clear from **17**, the Nineveh example and several other pieces that openwork mounts were well known in the East. There are two unprovenanced and unpublished examples on display in the Damascus National Museum, one showing an eagle surrounded by lettering with another text which I could not decipher. Jerusalem has produced an interesting variant of the eagle *phalera*, with lettering attributing the piece to *legio X Fretensis* (G. Stiebel, pers. comm.). Related in concept is another example from Egypt with lettering mentioning *legio VI Ferrata*, around a central motif of she-wolf and twins (Southern and Dixon 1996, 108, fig. 33). The second Damascus piece depicts Mithras, while a similar piece showing Hercules was found at Tell Barri (Pecorella 1987, fig. 50).

Baldric plates and terminals

A number of pieces (**30–36**) are tentatively identified as terminal plates from the free end of baldric straps (see below). However, these components seem to have been more variable and less diagnostic in form than baldric fasteners, and thus are harder to identify with certainty. Representations of sword-belts often show articulated ivy-leaf terminal pendants, also known archaeologically (Bishop and Coulston 1993, figs 91–2), but these are difficult to identify among the surviving pendants from Dura, most of which are probably from horse harness. However, **37** may be part of such pendant.

Buckles

A range of buckle types is attested at Dura, although most are represented only by fragments. Many are types known from other Roman sites. The complete buckle **71** appears doubly anomalous, in having a fixed loop in one piece with the attachment plate and in being made of iron; moreover, its closest parallels are Iranian. However, at a late stage evidence was found that it is not from Dura, but another site explored by the Yale/French Academy expedition (see catalogue). Other plain buckle loops could have been used by soldiers and civilians of any group in the region.

The numerous buckle loops are probably mostly from harness and straps rather than from waist-belts (L. Allason-Jones, pers. comm.). Some might belong to bags and other items. The heaviest are probably from horse harness, even though none are especially wide; buckles identified as belonging to girth straps are often about 30 mm wide (Hyland 1990, 135).

Buckle forms attested range from simple rings, with and without tongues, to tongued buckles with hinged loops of various shapes, some with substantial buckle plates.

Ring and frame buckles: Several small rings with a tongue or integral hooks or studs are known from Dura, and are interpreted as buckles or strap junctions (**38**–**42**). Only **42** is large enough to have come from a waist-belt (Figs 24, 25, 28), although some of the plain rings (e.g. **43**–**46**), and especially the valuable ivory **47**, could be from belts. Variants on the ring form were widely used as buckles in Europe during the middle imperial period, including completely plain rings which are only identifiable as buckles through their association in graves with a pair of studs which matches one type of belt fastening known from grave groups (e.g. graves 38 and 40, Intercisa, Hungary: Barkóczi *et al*. 1954, 82–4, pl. XXII:6–8, 13–15). The evidence from the Danube reveals a great variety of forms of ring buckles and ways of wearing them: some have tongues, or lateral loops to accommodate a hook or projecting stud-fastener. Elaborate ring buckles are known from graves 79 and 81 at Intercisa (Barkóczi *et al*. 1954, pl. XXV:1, 3: for others, see Alföldi *et al*. 1957, 456, fig. 99).

A variant which also involves a symmetrical fitting through which both ends of the belt were doubled is the frame buckle, such as **51**. Like ring buckles, these might also be employed with a stud on either side to secure the back-turned strap ends (Oldenstein 1976, 222 and fig. 9; e.g. Intercisa: Barkóczi *et al*. 1954, pl. XXII:13–15; Grave 3, Bruiu, Romania: Petculescu 1995, 128, pl. 3:1–3).

Simple tongued buckles: These have a loop and tongue which share a common spindle, articulated to a plate of some kind. Many of the loops lack plates, which in smaller cases may have been very light and thin, and therefore vulnerable to corrosion (e.g. **61**–**66**). **75** is probably a plate from a buckle of this type. Some plates were heavier: tongue **67** clearly relates to a square loop like **68**; such components were once articulated to a buckle plate functionally like **76**.

Composite belt buckle assemblies: Many waist-belts were apparently secured with tongued buckle assemblies, consisting of several components of a distinctive kind. These all seem to have been made in much the same way, though the buckle plate was decorated in a wide variety of styles and patterns, probably corresponding to other purely decorative plates on the strap. Only separate components survive from Dura, but complete examples from elsewhere (e.g. Romula, Romania: Petculescu 1995, 128, pl. 2: 1) show that such buckles were usually assembled from copper alloy components, comprising a tongue, a characteristic cast loop with separate articulations for tongue and plate (e.g. **72**–**74**), and a cast or sheet-metal decorative belt plate (e.g. **77**). The loop and plate were articulated together, and attached to the leather strap via a folded and riveted strip of thin hammered plate (Fig. 27). The buckle was often, if not universally, worn on the wearer's right side (e.g. the Lyons belt: Bishop and Coulston 1993, fig. 92).

Buckle and belt plates

It seems to be difficult to distinguish between functional buckle plates and purely decorative belt plates. Many are variants on a rectangular form, but there is a great variety of detail. Some have an elaborate squarish terminal at one end and, if not buckle plates, were perhaps positioned immediately opposite on the other side of the belt, as was evidently the case in the Lyons set (Wuilleumier 1950, fig. 1; Bishop and Coulston 1993, fig. 92; **77**–**81**). Other examples are also asymmetric (**84**, **85**), but some are simple rectangles (**86**–**88**).

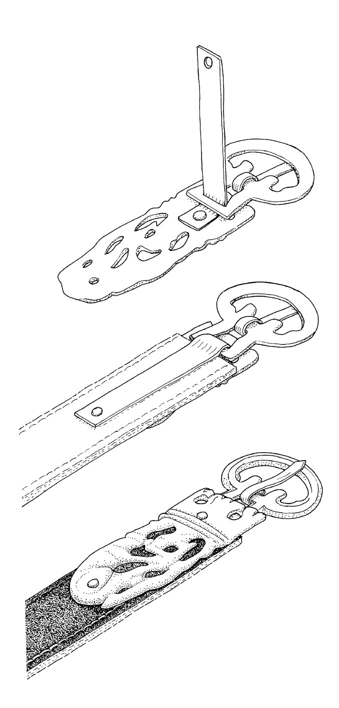


Figure 27 Reconstruction of a composite buckle, assembled from a cast buckle-plate and a cast loop with a tongue of strip-metal, linked together and attached to the leather belt by a riveted metal strip.

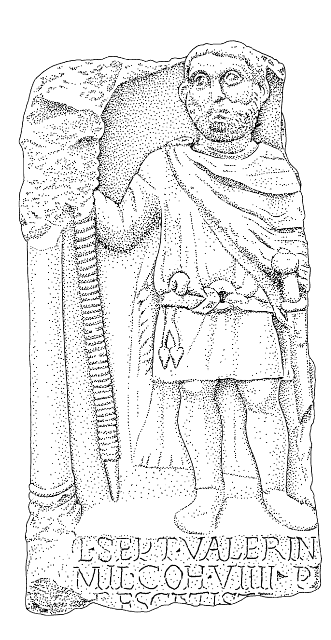


Figure 28 Tombstone of L. Septimius Valerinus of the ninth Praetorian cohort, Rome. Third century AD.

Attachment loops and rings

Dura has produced quite a distinctive group of articulated rings, intended for attachment to leather by a small, circular riveted plate (**113**–**125**). Of course such simple items could have had a variety of uses, but there are a number of reasons for suggesting that they may come from waist-belts. One may have been found with a pair of strap ends ascribed to such a belt (**113** with **159**); further evidence that such rings may have been employed to suspend items from the belt is presented below.

Button-and-loop fasteners
Several are known from Dura (**129–132**). Their function, or perhaps functions, remain obscure. Once thought to be peculiar to the north-western provinces, their discovery at Dura and other sites outside that zone vindicates Wild's prediction that they would be found to have a more general distribution (1970, 137).

Strap terminals and pendants
The site has produced a broad range of simple pendants with attachment rings or loops, and more elaborate objects, some hinged in the middle, with rivet holes and other features suggesting that they were attached to the ends of leather straps or belts. Most of these are types known or believed to have been used by soldiers. Some are fairly certainly attributable to waist-belts, on the basis of comparison with complete belt-sets found elsewhere (e.g. **135**); the considerable size and weight of other specimens, and parallels from other sites, indicate that they probably belong to horse harness; others again might have been used on baldrics. Many have attachments which would have been too delicate for any of these purposes. Some strap ends could be for less familiar purposes such as trouser-belts, normally hidden by the tunic; such a strap end seems to be depicted in a tomb painting of a servant carrying a pair of breeches at Silistra, Bulgaria (Brown 1971, fig. 18). In certain categories, extreme variation in size and robustness argues for a range of uses.

The range of ivy-leaf pendants found at Dura and the appearance of such pieces in representations serve to illustrate these points. For example, ivy-leaf pendants are clearly shown as belt terminals on the tombstone of L. Septimius Valerinus in the Baths of Diocletian at Rome (Fig. 28), but they are also depicted on representations probably of Roman horse harness at Bishapur (Fig. 31:E). At the other extreme, some of the very small and delicate ivy-leaf pendants may be secondary 'sub-pendants' attached to larger equestrian fittings (such as big *lunulae*: see an example from Moers-Asberg, Lawson 1978, 151, fig. 9, no. 9; and another from Vindonissa, Unz and Deschler-Erb 1997, nos 1277, 1282). Alternatively, they may have hung from brooches, civilian or military (such a brooch with a short chain and broken pendant is known from Carlisle, brooch F83, but has not yet been published: M. Snape pers. comm.). Several Dura brooches possess loops, perhaps for such pendants (Frisch and Toll 1949, enamelled bronzes 17–19). This fashion was well known in Syria, where a large gold brooch with three such pendants has been found (Stadtsmuseum Linz 1987, fig. 12, Damascus National Museum Inv. 4318/10127); such brooches are commonly seen on funerary portraits of wealthy women at Palmyra (Tanabe 1986, nos 329, 338; Dentzer-Feydy and Teixidor 1993, nos 170, 236). These examples remind us that the possibility of civilian use of some categories, such as the apparently Dura-specific type **166–177**, must be borne in mind.

Although some, like **147**, were a single piece rigidly attached to the strap, a high proportion of these strap terminals or pendants were articulated in some way, many at the point of attachment (via a free-swinging ring or loop). Heavier examples are bipartite and hinged, with one end riveted to the leather (e.g. **135**). This was presumably intended to make them jangle and flash more; even rigidly attached belt strap terminals were apparently worn in pairs, and so would clash in movement (p. 61).

Simple studs
The simplest form of all is the double-ended, spool-shaped stud (e.g. **239**). There are variants with slightly more elaborated front discs, decorated or worked up into a variety of domed shapes (**241–257**, **283–287**). Such variety is well known elsewhere, and evidently served a range of functions (e.g. Upper Germany: Oldenstein 1976, 168–9, nos 473–503). It is clear that some were purely decorative, especially those from horse harness straps (Fig. 32:C; see the third-century horse harness hoard from Zugmantel, *ORL* B8, 65, no. 1, pls 12, 73–4). Some plain studs are known to have been used in conjunction with ring buckles for fastening belt straps (see above). It is likely that the bone and apparently ivory examples (**247–253**) are from belts.

Simple studs, with a single integrally cast fastening on the back, appear in a variety of decorative shapes, including broad discs (**293**), cruciform patterns (**354**) and lentoid shapes (e.g. **296**).

Decorative strap mounts
A group of simple mounts, these seem to have been purely decorative in nature, with two or more attachments, usually mushroom-shaped and integrally cast. They range from plain round and disc studs to elaborate and even enamelled forms. The plate is worked into a variety of shapes, notably *peltae* and *lunulae* (**302–316**). Many of these are probably or possibly from horse harness, but some seem to have been used on belts and baldrics too (Fig. 24:B and C).

Spurs
Two copper alloy items (**325–326**) are identified as spurs on grounds of general conformation, although the details of their design, especially the hinge, have yet to be fully paralleled.

Bits and fittings from bridles and saddle harness
A small group of openwork mounts are identifiable from their round and rectangular edge-loops as cheek-pieces from snaffle bits (**327–336**), and probable saddle harness junctions (**337** and **339**). Another group of strap mounts probably belong to bridles or reins (**340–354**), as does a group of phallic pendants (**357–360**). Many of these items are well paralleled on the Danube or Rhine.

'Saddle plates'
Several curious thin, pierced plates are recorded, although only fragments of them now survive (**361–367**). Evidently intended for attachment to one or more thin straps, several of these were clearly used in pairs, and shared a simple locking mechanism which allowed them to be connected in three fixed positions. Their purpose is not certain, but in general size and appearance they resemble 'saddle plates' of the early imperial period, which were primarily decorative attachments hung below the saddle at the front and rear on either side.

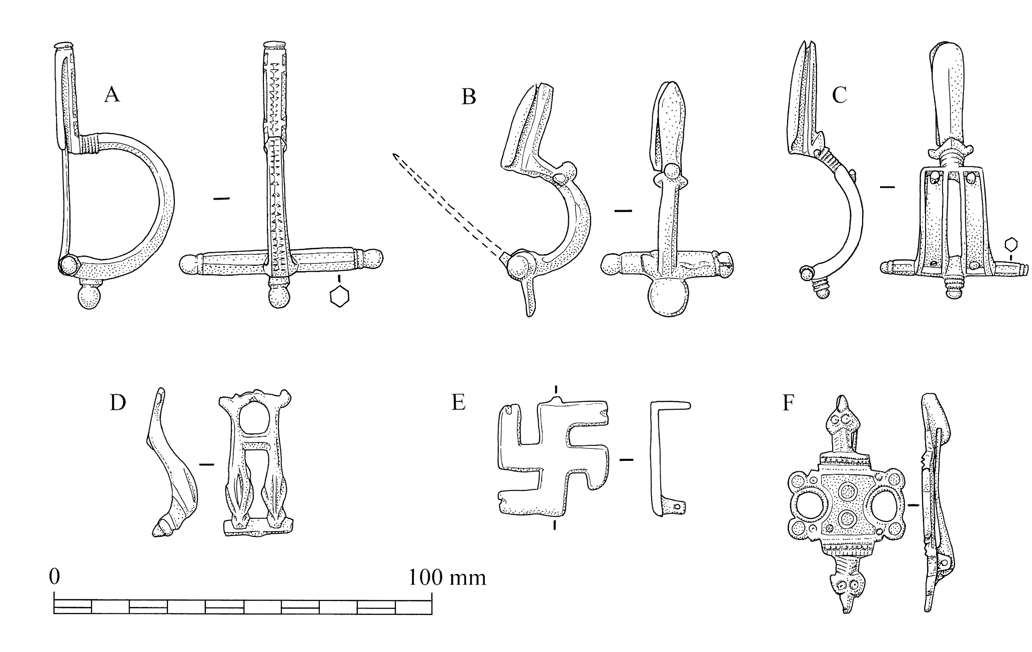


Figure 29 Examples of brooches from Dura, drawn with the fixing-pins pointing upwards, the way they are shown worn in representations; conventionally they are published 'upside-down'.
A 'Crossbow' brooch (1938.1977; Frisch and Toll 1949, fibula 91)
B 'Crossbow' brooch (1938.2011; Frisch and Toll 1949, fibula 67)
C Double-bow brooch (1938.1994; Frisch and Toll 1949, fibula 117)
D Dolphin brooch (1938.2005; Frisch and Toll 1949, fibula 25)
E Swastika plate brooch (1932.1399; Frisch and Toll 1949, fibula 139). The incomplete arm appears to be due to faulty casting
F Enameled brooch (1938.2171; Frisch and Toll 1949, enameled bronze 29)

Brooches

Around 180 brooches were recovered from the site, the great majority of which were copper alloy bow and plate brooches, some with glass inlay (Fig. 29); these were published by Frisch and Toll (1949). Two other brooches are known: the first is a silver trapezoidal brooch, set with garnets (*Rep*. II, 78, 81–2, no. 9, pl. XLIV:1; *Rep*. IV, 256, pl. XXVI:5). It was buried in association with a hoard of coins, including issues of Valerian and Gallienus, and other silver jewellery near the Palmyrene Gate (*Rep*. II, 10, 76). The second is a massive gold plate brooch, with an inset intaglio-cut gem within a circle of garnet and glass cabochons, found 'just outside' the palace of the *dux ripae* (I 692, now in Damascus, National Museum Inv. 7008: *Rep*. IX.iii, 58–62, pl. XII). The reader is referred to these publications for full details, but the present wider context of discussion and the results of subsequent research require some further comment. With some interesting exceptions, the brooches are overwhelmingly of Roman provincial types, many of which only became current in the third century AD, so the assemblage should generally be assigned to the Roman occupation, even in the absence of proper stratigraphic contexts.

It is evident from representations and from documentary sources that Roman soldiers wore brooches, of both plate and bow types, all of which are represented at Dura. Indeed several were found in the Tower 19 countermine: one (of unidentifiable type) among the bodies, while two others, not now definitely identifiable but clearly depicted as crossbows, were found with the soldiers in the mine (Figs 13 and 14; *Rep*. VI, 194; Frisch and Toll 1949, fibulae 31–96 for these types). Representations show that a brooch was worn on the right shoulder as a cloak fastener; however, since it is a relatively small object, the exact type is rarely precisely identifiable. Bow brooches are shown (Fig. 24:E), although various kinds of round plate brooches, sometimes very elaborate, predominate; some have several pendants (Figs 24:B and 31:C). At Palmyra, the tombstone of a Roman cavalryman, Vibius Apollinaris, shows a round brooch with three ivy-leaf pendants on short chains, albeit curiously located on the left shoulder (Colledge 1976, 225, pl. 145). Several probable examples have been recovered at Dura (Frisch and Toll 1949, enamelled bronzes 17–19).

It should be observed that the more elaborate and decorative plate types often seem too lightly-made, and are too flat, to hold the substantial mass of textile required to fasten a cloak securely. Some, such as the swastika and double-ring examples from Dura (Fig. 29:E and F), may be more badges worn additional to plainer cloak-fastenings.

There was probably considerable fine-scale diachronic, and perhaps regional, variation in the patterns of military brooch usage, but in the absence of a large number of closely dated and highly detailed representations or, better, of a large number of unambiguous grave groups, these are currently hardly discernible.

The designs of the predominant copper alloy examples suggest the brooch was generally intended to be prominent, even showy, but was not inherently especially valuable; in the Roman world the weight of precious metal used in an object seems to have been far more important than its workmanship, suggesting that even elaborately enamelled copper alloy pieces would not have commanded a great price. The message conveyed by such highly visible items, worn close to the face, was not one of monetary wealth.

It is certain, then, that Roman soldiers at Dura wore cloaks, probably routinely as the general pattern of representations suggests. At least some of the Dura brooches are evidently from military dress, but which ones? Of course some civilians in the Roman world also wore them, at least in certain geographical areas. Was this true of the civilian population at Dura?

There is little direct archaeological or representational evidence for the extent and nature of brooch-wearing among the civilian Durenes of the second and third centuries AD, although a handful of local elbow brooches, dating from an earlier period, are known (Frisch and Toll 1949, nos 1–5). The rather surprising presence of a group of Roman provincial-style 'Aucissa' types (Frisch and Toll 1949, nos 6–16) defies explanation in terms of the Roman army; such types disappeared in the first century AD in Britain (Mackreth 1973, 24–5; Snape 1993, 12), but may have continued into the second century on the Danube (Frisch and Toll 1949, 45). Later survival in the Eastern provinces is possible, their deposition at Dura then post-dating AD 165, but unless their presence is to be

assigned to the very brief Trajanic occupation, it more probably demonstrates the continued use of brooches under Parthian rule, at least among some at Dura, during the first and second centuries AD. However, evidence from the wider region suggests that such copper alloy brooches were not widely worn by indigenous peoples at Dura or elsewhere, and that brooches of any kind may have been the preserve of particular groups.

Archaeological evidence of any kind for the pattern of use of brooches in the East, let alone good contextual information from sources such as grave groups, is still woefully thin. However, there is some highly detailed representational evidence, largely from Palmyra. Dura cannot match the detailed record of dress styles provided by the Palmyrene funerary busts: many of the Durene representations of figures are fragmentary or lacking in detail, and many are religious scenes, in which mortals and especially deities may be shown in conventionalized dress rather than in actual current styles. Notwithstanding this, the range of figures, male and female, in the Dura paintings suggests that prominent men and women generally wore Greek dress, Iranian garments (i.e. 'trouser suits' for males) or regional costume styles closely related to those of Hatra and especially Palmyra. The latter included versions of the tunic/trousers combination or the longer robes of the desert regions (see Tanabe 1986, Dentzer-Feydy and Teixidor 1993). None of these ensembles required brooches for fastening.

It is notable that the brooch assemblage includes two examples made of precious metals, both of which point towards Palmyrene connections. The only silver brooch is of a local trapezoidal form, related to the Palmyrene portraits which show it to be a female type, worn at the left shoulder to fasten a draped garment over a sleeved tunic and under the veil (see above; Colledge 1976, 151–2; Tanabe 1986, nos 195, 273). This regional form seems to have disappeared from Palmyra around the time the Romans took Dura (perhaps the Durene find was an heirloom). Thereafter, Palmyrene ladies wealthy enough to boast a funerary portrait wear brooches similar in general form to those on contemporary male portraits, i.e. round, polygonal or with indented edges. Women's brooches sometimes bear three ivy-leaf pendants on short chains, still worn at the left shoulder (Colledge 1976, 152, e.g. pls 89, 92; Tanabe 1986, nos 203, 329, 335, 338, 348). Men wear brooches of similar but less elaborate form at the right shoulder, to fasten cloaks (Colledge 1976, 152, pls 61, 66, 82; Tanabe 1986, nos 283, 412). The massive gold brooch found near the palace of the *dux* fits well in this Palmyrene milieu (see above).

While it is possible that base metal brooches were widely worn, it is suggested that among Palmyrenes and apparently Durenes of the second and third centuries, the wearing of brooches was exclusively a practice of the wealthy (who probably wore brooches made of precious metals, as are both the brooches of particularly Palmyrene style at Dura) or of warriors; it remains possible that civilians of lesser rank wore brooches of base metal, but, if so, there is no evidence for it. Some men in the region, at Palmyra and elsewhere, especially when wearing weapons of war, wore brooched cloaks, perhaps the *chlamys* rather than the rectangular Roman *sagum* (Fig. 26:E; Colledge 1976, 152). It may be that the unexpected copper alloy Aucissa types at Dura belonged to the Palmyrene troops based there under later Parthian rule (p. 16); they may have worn the Roman *sagum*, since the Palmyrenes certainly adopted other aspects of Roman equipment in the early imperial period.

The efflorescence of copper alloy brooches of known Roman provincial types surely occurred with the coming of the Roman army, with at least part of the surviving assemblage belonging to the soldiers' cloaks. The Dura assemblage, with the exception of the Aucissa brooches, is very similar in structure to assemblages from Hadrian's Wall and the German frontier (Snape 1993, groups 5, 8 and 14). Similarly 'most of the types of fibulae found at Dura are also very common in Patek's catalogue of Pannonian fibulae' (Frisch and Toll 1949, 46). It may be suggested that the Dura material constitutes a fairly typical middle imperial military site assemblage, i.e. consisting mostly of types common across the empire, with a few exotica.

Many of the examples recovered are heavy bow types, suitable for gathering the folds of a thick cloak; these have strong military associations, and include early 'crossbow' variants (with a cross-bar and a knob at the end: Fig. 29:A and B; Frisch and Toll 1949, nos 31–96) typologically ancestral to the heavy late imperial types which were badges of imperial service. The early forms seem to have a frontier distribution, which is consistent with the idea that they began as specifically military types in the third century (M. Snape, pers. comm.). Similarly the 'divided bows' and related variants (Frisch and Toll 1949, nos 98–117) are common on northern military sites in Britain, but not on civil sites. The earliest examples are from Carpow, *c.* AD 200 (Snape 1993, 21).

On the other hand, the assemblage lacks certain types familiar on other frontiers. Frisch and Toll note a complete absence of the Pannonian trumpet types which were very abundant in the Danube region, and a similar absence of Thracian and Illyrian 'anchor' types, or Germanic 'eye' and 'spring T' types (1949, 46). Some of these types may be missing simply because they were no longer current by the later second and third centuries (M. Snape pers. comm.), but others might belong to styles of civilian male and female dress local to the Danube. It is clear that the full subtleties of the Dura brooch assemblage demand a detailed reappraisal by specialists to take account of half a century of new research.

It is quite possible that, with the exceptions noted above, this is in effect a collection consisting exclusively of military pieces; Frisch and Toll thought that they were largely military, not least on the basis of their distribution within the town (1949, 45). However, it would be dangerous to insist on this too strongly; the distributional evidence is highly suspect (pp. 235–6), and other factors also make the equation uncertain. The new Roman brooch fashions may well have spread quickly beyond the ranks of the soldiers via various routes, and indeed these same brooch types may well already have been seen on the clothing of soldiers' dependants (wives, servants, grooms) when the various Roman garrison contingents arrived. It may be that the adoption of such brooches by Durenes was a feature of the Romanization of the city.

Certain types such as double-bow brooches may, for example, have originally been a popular soldierly fashion, but may later have been worn by soldiers' dependants, expressing direct personal connections with individuals (as keepsakes or bequests for instance) or general membership of the broader military community. This could have occurred without

undermining any specifically military symbolism of particular brooch types, for this was contextual, depending on the brooch being worn at the right shoulder, on a particular type of cloak and as part of a range of military symbols. The same brooch could quite obviously mean very different things if worn by different groups in different ways, with different clothing, either across the gender divide, or among different sets of males or females. Such more or less sanctioned transformations of originally military artefacts might be contrasted with deliberate transgressions of such dress codes by those outside the military community, intended to appropriate the aura of military authority, if not directly to deceive. It remains possible that most Durenes in Roman times wore brooches, although as we have seen, for men, at least, most local clothing traditions did not require them.

Textiles

Dura's textile remains have been published, and the reader is referred to the *Report* for technical details (Pfister and Bellinger 1945). Some of the tunic fragments may be military. The material does at least give an idea of the local repertoire of materials and techniques available for the manufacture of military dress. Most of the surviving fabrics are wool (tunics for example), although linen was used, notably for armour padding (**448**, **449**, **450**). Silk and cotton were also found in very small quantities.

Much of the textile was undyed wool now of various shades from 'grayish-buff through various browns to brownish-black' (Pfister and Bellinger 1945, 4). Originally, many of the lighter fragments were probably shades of off-white. Pale wool could be dyed to various shades from yellow to brown with easily available vegetable dyes, while 'the light-colored fabrics frequently have stripes or bands of purple running from grayish-blue through a brownish-violet to brownish-black', apparently usually the result of applying madder red to an indigo base, which can produce a good purple shade. True *Murex* purple was also believed to be present in some pieces (Pfister and Bellinger 1945, 5–6).

Leather

Leather was of course a key material in military dress and harness for footwear, belts and straps (for a survey of the evidence for early imperial military leather work, see Van Driel-Murray 1985). Its use in armour and shields is discussed in the relevant sections. The surviving leather from Dura has been studied in the past, but remains largely unpublished (Kaplan 1971).

While footwear is well-known from the Roman empire, very few belts or horse harness straps are known, probably because oiled or alum-tawed, rather than tanned, leather was employed (Bishop and Coulston 1993, 194). Shoes may tend to survive more often because they were made from tanned hide. A number were recovered from Dura, and are discussed below. Most of the extant Dura leather has been identified as vegetable-tanned goatskin, with cattle hide mostly used for shoe-soles (Kaplan 1971, 4–5). Generally the leather seems not to have been dyed, but was simply finished with beeswax, as 'a vehicle for the application of blacking' (Kaplan 1971, 5), although cuisse **442** is made from red and black leather.

Military dress at Dura

Non-Roman military dress

'Military dress' is perhaps more applicable to local Syrian, Mesopotamian and Iranian traditions, inasmuch as it seems that most soldiers of polities in these regions did not serve in the kinds of permanent, regular state formations seen in Rome, but more often in the retinues of nobles (pp. 15–17). The personal nature of service probably makes 'military dress' the most appropriate term: it is likely that there were strong conventions concerning the dress deemed appropriate to warriors, probably specific to different ethnic groups, but these customs did not necessarily constitute rigid rules.

However, very little of the material from Dura consists of items which are not known to be part of the Roman repertoire; even the 'Persian' in the Tower 19 mine was identified as such from his armour and the apparently associated helmet and sword-hilt, not from items of his dress, of which only a small pendant (now lost) survived. It is possible that some items of Roman military type were deposited at Dura by Palmyrenes or perhaps even by the Durenes themselves, either before or after the Roman annexation of the town; it is clear that Palmyrenes had long since adopted some aspects of Roman equipment (p. 246). However, looking at the broader context of metalwork and equipment finds, the deposits are best explained as overwhelmingly representing the debris of the defeated Roman garrison.

Roman military dress

In general, the existing archaeological evidence from Roman military sites is very substantial, and permits us to identify some categories of artefact characteristic of military contexts. However, more specific functional interpretation often eludes us, particularly for questions of dress, for the archaeology generally consists of disarticulated fragments, mostly metal components of items of dress where the organic elements – textile and especially leather – vanished long ago. For example, apart from one or two probably Roman leather baldrics found in Denmark (see below), no complete belts have been found, although some complete sets of belt fittings are known from graves. However, unambiguous archaeological evidence for the original spatial arrangements of these fittings remains elusive.

Material evidence from Dura for this area is especially rich in quantity, if lacking much contextual information. It includes large numbers of apparently military brooches and metal fittings, some footwear and a few textile remains.

However, in combination with other data, much progress may be made. Ancient textual sources may provide important additional information, but the difficulties of unambiguously equating specific terms they use with categories of excavated artefacts are formidable and represent a specialist area which is not explored in detail here, on grounds of lack of space and lack of expertise. On the other hand, the excellent representational evidence available from Dura and elsewhere provides the key to comprehending the details of Roman military dress in terms of its physical conformation and the ways in which it was worn and used. The use of images and artefacts together in a process of mutual elucidation permits the reconstruction of military dress to be undertaken with some confidence.

Representational evidence of Roman military dress
There is a substantial body of images of middle imperial soldiers from across the empire, largely funerary or other portraiture which may be considered as essentially self-representations, which give us a detailed view of the nature of third-century military dress styles.

The largest group of images consists of full-length tomb portraits, an Illyrian-inspired revival of the earlier fashion for detailed depictions of soldiers on funerary stelae (Figs 24:A–E and G, 25 and 28: e.g. Coulston 1987; Franzoni 1987, nos 12–17, 19, 20, 59; Oldenstein 1976, figs 13–14; Pfühl and Möbius 1977, nos 301–16; Speidel 1976; Speidel 1994, pls 9–10, 12, 14–16). Examples are known from many provinces across the empire, from Mauretania (Ain Schkor: Boube-Piccot 1994, pl. 102) to Syria, where an important group was recently discovered at Apamea (Balty 1988; Balty and Van Rengen 1993). Most of these monuments are dated to the first half of the third century.

Some full-colour painted depictions also survive, from Egypt and from Dura itself.

There is a mummy portrait, painted on textile, of a soldier in middle imperial uniform, from Deir el Medineh (Luxor Museum 1979, 186–7, no. 290, fig. 154 and pl. XV), while from the Fayum comes a double portrait of two males, probably brothers, one of whom is in military dress (Bianchi-Bandinelli 1971, 284, pl. 260).

Among the images from Dura discussed above (pp. 39–42), the most immediately relevant examples are the Terentius and Heliodorus paintings. These are among the most informative available to us.

Such images are supported by some rather more formal images, mostly of a slightly later date (Tetrarchic to Constantinian), which clearly show, often in great detail, the maintenance and development of the fashions of the earlier third century. These include the Tetrarchic frescoes from the military headquarters at Luxor (Kalavrezou-Maxeiner 1975), and the many figures of soldiers and uniformed officials in the early fourth-century mosaics at Piazza Armerina in Sicily (Carandini *et al*. 1982). They show military dress little changed from that of fifty years before.

Unusually, there is some corroborative evidence from beyond the Roman empire, which confirms and refines the information from Roman sources. Several of the Sasanian royal reliefs, created at the behest of Shapur I, depict the appearance of uniformed emperors and some other Romans in great detail (Fig. 24:F and H; p. 45).

This rich representational record for middle imperial military dress is remarkably consistent throughout the range of artistic contexts and media, spanning the entire empire. Almost all these representations show soldiers without their armour but with their swords and military belts, i.e. in so-called camp dress.

This material, used in conjunction with the evidence of paintings from Dura itself and with the rich archaeological remains at the site, allow us to reconstruct the dress of the soldiers of the garrison in fine detail.

Reconstruction of Roman military dress at Dura
The characteristic appearance of soldiers was largely a matter of what was worn and carried, and how it was used. However, soldierly appearance was also a matter of the personal grooming and deportment of soldiers, their 'military bearing' and behaviour. These fascinating aspects cannot be investigated through archaeology alone, and limitations of space mean that a fuller discussion must be reserved for another place (see also James 1999). However, it should be noted that the Dura representational evidence, notably the Terentius and Heliodorus paintings, typically show soldiers with short beards and short hair, consistent with wider military-inspired male fashions of the period.

The military dress of the time, as we have seen, varied in many details such as decorative fittings, but in its general components and conformation, and even general colours, was quite highly standardized. It was the ensemble, as much as the cut, materials and decoration of individual components, which was characteristically military.

Dress consisted of the following components, arranged roughly in the order in which they would have been donned:

1 Undergarments (presumed)
2 Breeches
3 Footwear
4 Tunic
5 Military belt
6 Sword, on a baldric
7 Cloak and brooch
8 Accessories, such as a purse, finger-rings, etc.
9 Military staff (some soldiers)

NB There is no sign that hats were a routine part of military dress at this period.

Undergarments
Little is known of undergarments at this period (they do not seem to be depicted!), although at least a loincloth (*subligaria*) was very probably worn (N. Goldman 1994b, 233; *Tab. Vindol*. II, 346, refers to *subligarii*). There is a possibility that more substantial underclothes, probably of linen, were usual, worn for comfort beneath scratchy wool and for ease of washing. At the end of the fourth century, St Jerome wrote that priests had adopted the *camisia*, a tight-fitting linen shirt with long, narrow sleeves, from the military (Wild 1968, 221: Jerome, *Epist*. 64.11). Could this have been an undershirt worn beneath a woollen tunic? Socks are discussed with footwear, below.

Breeches
All of the soldiers on the Terentius painting appear to be wearing close-fitting breeches (Fig. 20). The funerary stelae from elsewhere sometimes depict longitudinal folds down the shins of full-length breeches, but it has been suggested that at this period legs may still sometimes have been bare (Bishop and Coulston 1993, 153). In my view, by the early third century the military fashion of the Tetrarchic period and beyond was already established; that is, all soldiers wore close-fitting full-length breeches. Ties at the back of the calf, laced up after pulling the breeches on may have been employed to eliminate folds and creases. An example of trousers with such ties is known from Thorsbjerg (Schablow 1976, fig. 168).

Long trousers are shown being carried by servants in a fourth-century painted tomb at Silistra, Bulgaria (Brown 1971, fig. 18). They were secured at the waist by a tape or belt running through waist-loops; the example in the painting seems to terminate in a metal strap end, which might also imply a light buckle at the other end. These breeches have sewn-in feet, a

feature seen on two pairs of trousers found in Free Germany (Thorsbjerg: Schablow 1976, figs 162–3, 170–1). It seems likely that by the fourth century sewn-in feet were a common, if not universal, component of the breeches worn by Roman soldiers and officials. I would suggest that this was already true of breeches worn by soldiers from the end of the second century onwards; this would explain the longitudinal stretch-folds down the shin seen on the funerary stelae, which must otherwise be explained by tight ankle ties or a loop under the instep.

No archaeological examples have been identified at Dura, but it is likely that they were made from wool. The breeches worn by Terentius and his men appear to be of a dark grey or reddish-grey hue. Those worn by the soldiers in the Piazza Armerina mosaics were unequivocally grey (Carandini *et al*. 1982). Such shades might arise from natural wool colours, which at Dura ranged 'from grayish-buff through various browns to brownish-black' (Pfister and Bellinger 1945, 4), perhaps modified when necessary with dyes.

Footwear

By the third century the famous heavy military sandal, the *caliga*, had long since disappeared (Bishop and Coulston 1993, 119). Soldiers' shoes were usually variants of the civilian *calceus*, still hobnailed (Kaplan 1971, 6) for protection and durability, and surely for their characteristic sound. *Calcei* were 'shoes entirely encasing the foot . . . a Roman contribution to ancient footwear in the Mediterranean world' (N. Goldman 1994a, 116). In the third century 'both pointed and flat-ended boots are depicted on [military] sculptures. Some open-topped shoes have a strap across the front of the ankle . . .' (Bishop and Coulston 1993, 155). This last detail suggests the 'eyelet boot . . ., whose uppers are cut from a single piece of leather in an ingenious fashion that includes a long lace for each side cut in a tapering curve that arcs over the top of the cutting pattern, making conservative use of the leather . . .The ankle-high shoeboot was sewn together up the toe section, with a triangular tip added to the toe as reinforcement [Fig. 29]. A sole was then hobnailed to the under-section' (N. Goldman 1994a, 119–22). An example of such a boot, which was an increasingly common type during the early decades of the third century, was found at Dura, albeit in a size suggesting it belonged to a woman or youth (Kaplan 1971, No. 8; C. van Driel-Murray, pers. comm.).

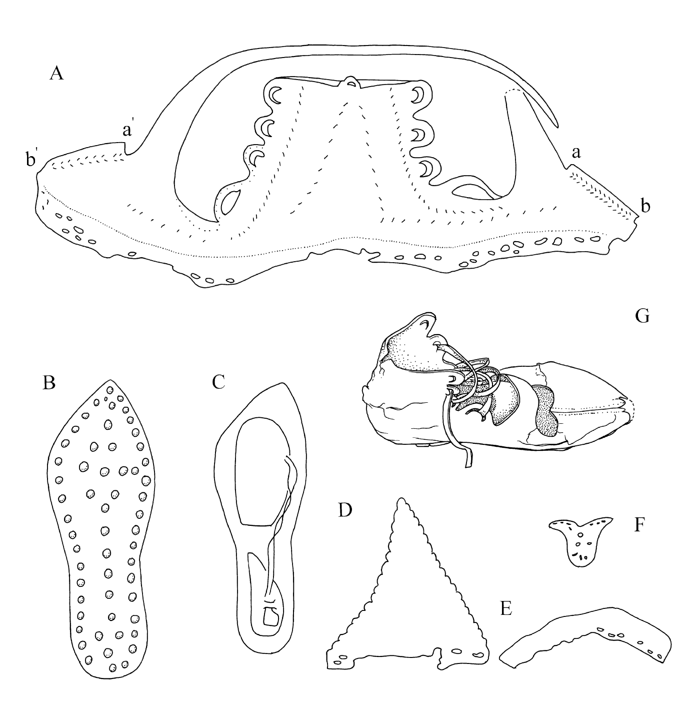


Figure 30 The construction of the 'shoeboot', the kind of footwear probably standard among Roman soldiers at Dura in the second quarter of the third century AD (after van Driel-Murray).
A The single-piece upper, seen from the inside. Edge a–b meets a'–b' to form a seam down the front of the foot.
B The hobnailed outer sole.
C Inner sole with packing.
D Internal heel reinforcement.
E Heel stiffener.
F External toe guard.
G The complete 'shoeboot'.

Socks (*udones*) were sometimes worn across the Roman provinces, to counter chafing or against cold weather. They are attested both archaeologically and in documents at Vindolanda for example, which produced a child-size ankle-length sock dated to the late first or early second century AD, and a reference in a contemporaneous writing tablet (Bowman 1994, pl. 1, bottom; Wild 1993, 83, T/316; *Tab. Vindol*. II, 346). The same site also produced a textile insole (Wild 1993, 83, T/15). Socks are further attested at Masada (Sheffer and Granger-Taylor 1994, 221–2, 109(Z), fig. 136). It seems that the curious 'rolls' at the ankles shown in a number of third-century Roman military tombstones must be socks, suggesting they were quite widely worn by soldiers (Figs 24:C, F, G; 25:F).

The tunic

Third-century representations of soldiers show them wearing a long-sleeved pull-over tunic which reached to mid-thigh or almost to the knee. The coloured images from Dura and elsewhere show this as white, with small areas, mainly bands, of purplish hue. The general use of white military tunics in the third to early fourth centuries is corroborated at Piazza Armerina (Carandini *et al*. 1982) and in Egypt (Bianchi-Bandinelli 1971, 284, pl. 260; Luxor Museum 1979, 186–7, no. 290, fig. 154 and pl. XV). There is no clear evidence for other colours of military tunic in this era; white seems to have become the normal colour by the early third century if not earlier (Sander 1963, 154–5). It remains possible that the tunics depicted are all 'best' or 'dress' garments, and that different coloured tunics were worn on campaign and in combat, but there is no real evidence supporting this.

Military tunics were part of a range of male tunic types which varied in proportion but which were all made in the same way. Most of the fragmentary examples known from Dura, and many more complete pieces from Egypt, are wool, but linen examples also occur. They were woven on a very wide loom as a single cruciform piece of cloth, from one sleeve to the other, with a simple slit for the neck (Pfister and Bellinger 1945, 14).

The patterns of purple decoration on the white ground were tapestry-woven into the textile as it was made, and consisted of bands, for example at the neck-slit, over the shoulders and up from the hem, and cuff bands, which did not extend all the way around the sleeve. Several undyed woollen pieces from Dura, apparently from the shoulders of tunics, preserve such vertical bands, 'single, double or triple and terminated by triangular "arrowheads" . . . On the shoulder of the tunic, on both sides of the aperture for the neck, a step-pyramid invariably accompanies the arrowhead pattern . . .' (Pfister and Bellinger

1945, 6–8; e.g. no. 14, pl. IX). In the painting, Terentius himself had simple notched bands at his shoulders, a common enough pattern on male garments seen also in the synagogue paintings, and on the military tunic in the Fayum double-portrait (Bianchi-Bandinelli 1971, 284, pl. 260).

The dye used for the coloured areas may sometimes have been true Tyrian purple, but far more often was a substitute probably compounded from madder-based red and perhaps indigo (Pfister and Bellinger 1945, 1–9, 14–15). Various hues were apparently distinguished and deliberately reproduced in this manner, albeit with inconsistent results and a vulnerability to fading (Sebesta 1994, 71).

Once woven, the tunic was then stitched together down the sides and under the arms to produce a fairly voluminous sleeved 'T-shirt' (Pfister and Bellinger 1945, 14).

It is suggested that the soldier's tunic of the mid-third century had already developed specifically military details, perhaps in the patterns of decoration, but notably in the cut: military examples were probably narrower in the body and therefore proportionately longer in the sleeve than civilian tunics. Tombstones suggest that military tunics tended to be pulled up and somewhat over the belt.

No definite examples of specifically military tunics have been identified; the surviving fragments of tunics from Dura could be civilian or military. One might expect soldiers to opt for woollen tunics for service purposes, as wool has better insulation properties than linen, although it was harder to clean. The choice of whitish shades was apparently culturally determined rather than practical: it was probably not chosen to reflect heat, since a dark cloak was usually worn over it. Rather, it marked a degree of prosperity (in aspiring to a white garment which was relatively expensive and difficult to keep clean) and, more generally, white was associated with free male dress (e.g. in Palestine, and at Dura itself: Roussin 1994, 186).

There are some interesting variants on the standard pattern. In the Terentius painting, a figure in the front rank has two distinct swastikas, believed to have been purple originally, on the lower hem of his tunic, one over each thigh (Fig. 19:K). The proportions shown, if any guide, suggest that these were about three inches square. The choice of swastika motifs is not itself startling, as baldric mounts and brooches with this pattern (rotating either way) are attested at Dura (**26**; Frisch and Toll 1949, brooches 137–41; semicylindrical shield **629**), and other sites. There is an armed figure, probably a soldier, in a tunic with a swastika in exactly the same place, although rotating the other way, in the Great Hunt mosaic at Piazza Armerina (Carandini *et al*. 1982, pl. 15). Another swastika is to be seen on the shoulder of the tunic of a figure, apparently a soldier, in a painting of two males, dated to the second century AD, from the Fayum (Bianchi-Bandinelli 1971, 284, pl. 260). The equal-armed crosses seen on the tunic of the officiating soldier in another Durene wall-painting may be a variant on the theme (pp. 39–40, Fig. 21). No particular known significance is attached to the swastika in the Roman world, although it is often regarded as a sun symbol (L. Allason-Jones, pers. comm.). However, its prominence here may suggest that in this special context it held a specific and significant meaning, perhaps denoting rank or office, as does the royal crown when it appears on the epaulette or above shoulder stripes on modern British army uniform.

The waist-belt

During the third century the waist-belt, usually ornamented, was becoming the essential symbol of military service which it was *par excellence* under the Tetrarchy and beyond. The term *cingulum* was not used in the literature for the military belt until the third century (before that it was called the *balteus*: Bishop and Coulston 1993, 96). The profound symbolic nature of the soldier's belt during the middle and later empire is clear from some interesting references to the public rejection of military service by soldier-saints through the symbolic throwing off of the *cingulum* (Woods 1993, 55–60; see also Coulston 1998, 184).

The belt, presumably of leather, with edge stitching to stop it stretching out of shape (Figs 24:A, B; 31:C), also retained functional utility, helping to retain the often rather baggy tunic in the desired arrangement, although it was no longer primarily intended for carrying weapons; the sword was worn on a separate baldric, while daggers, although attested (**522**, **528**?, **583**?, **584**?, **585**–**588**), are not visible on representations and may have been optional. Some middle imperial belt-sets apparently do retain dagger-frogs, e.g. the example from Chichester (see below).

So far, no complete leather belts are known from the Roman empire, but some grave groups preserve more or less complete sets of metal belt mounts. Examples include a copper alloy set from Lyons with a coin-dated *terminus post quem* of AD 194 (Wuilleumier 1950); an enamelled set from Chichester (Burial Group 251: Down and Rule 1971, 117, fig. 5.18) and a copper alloy set from Grave 6, Lechinta de Mures, Romania (Petculescu 1995, 134–6).

The components of such sets are usually all made of the same metal, mostly copper alloy. However, several third-century European belt-sets are all of silver, sometimes with gilding and high-quality inlay, including very showy fittings from broad belts with frame buckles and heavy, paired strap ends. Fischer (1988) has published examples from Budapest (with a coin of 287), Silistra and Köln, plus an unprovenanced silver-gilt *cingulum* set with a silver-gilt brooch (now in Munich: Fischer 1988, 167–9, fig. 1).

Complete preserved sets and the testimony of contemporary representations allow the many isolated belt components to be identified with some confidence. Moreover, the third century funerary stelae show how the belts were assembled and the specific ways of fastening and wearing them.

Archaeological evidence for these items of dress consists of buckles, studs and mounts which are often more decorative than functional, and strap ends which may be simple plates or complex hinged affairs. The latter were worn in pairs. The dimensions of fittings suggest a range of belt widths, from *c*.25 mm to at least 40 mm. The 'silver alloy' frame buckle **51** belonged to a belt *c*.30 mm wide, while the large enamelled plate **90** is 40 mm wide, if worn sideways. Evidence from South Shields suggests that such big belt plates were also worn upright on a very wide belt (Allason-Jones and Miket 1984, 3.10, the set of enamelled plates), but there is no clear sign of such a practice at Dura.

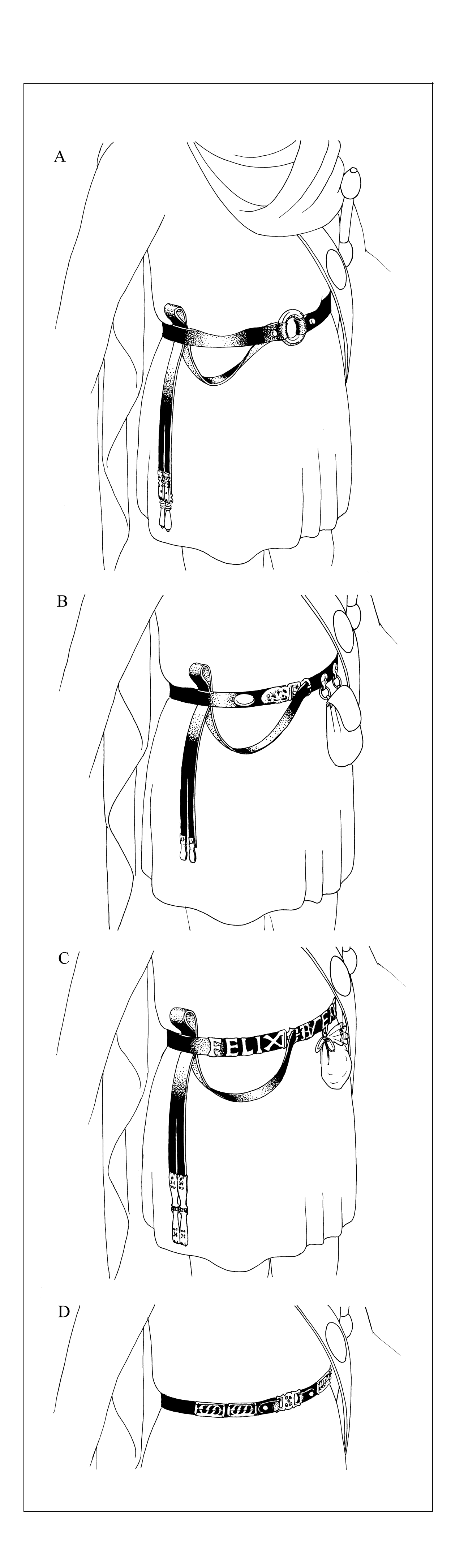


Figure 31 Reconstructions of belts, based on finds of fittings from Dura, and representational evidence from the Terentius painting and other sources. NB the combinations are hypothetical.
A Simple ring buckle, studs and pendants of bone or ivory.
B Copper alloy fittings: a composite buckle, decorative mount, suspension (?) rings with inferred purse, and simple strap terminals.
C A *FELIX VTERE* belt-set and heavy, hinged strap ends, all in copper alloy.
D Metal frame buckle secured with simple studs, and belt embellished with cast, openwork plates.

Two basic belt designs are attested, both of which fastened in the region of the navel. The first type used a conventional tongued buckle attached to the end of the strap on the wearer's right side (Fig. 31:B and C). The second employed a ring buckle or frame buckle (Fig. 31:A and D). With plain ring buckles, double-headed studs were often used to secure the turned-back belt ends.

Many belts depicted on tombstones and other monuments depict greatly extended strap ends running from the buckle, sometimes on both sides (Fig. 24:C), more usually just on the wearer's right side (Figs 24:B, E–H; 25:A; 28; 32:C). Usually hanging in a curved swag below the belt, the long strap end was caught under or around the belt at the right hip, and allowed to hang down the thigh (Figs 24:B, E–G; 31:A–C). Where seen in detail, the strap end is bifurcated and terminates in a pair of pendants (Figs 24:B, E; 25:A; 28; 32:C). These terminals came in a variety of shapes, including ivy-leaves, tubular forms (see **187**) and heavy hinged examples (see **135**). There is no obvious practical function for such terminals, but the position in which they are shown on the tombstones, hanging far down the right thigh, makes it evident that metal examples at least were intended to jangle together as the soldier moved, making a noise like a bunch of keys which, in combination with the rhythmic crunch of hobnailed shoes, was as characteristic of an approaching soldier as the sight of his uniform. Bishop notes how men are seen 'fidgeting' with them on some third century tombstones (see Figs 24:E and G; Bishop 1992, 101): on the contrary, they are drawing the viewer's attention to an important symbol of their status which could be both seen and heard – the *cingulum*.

In the Terentius painting (Fig. 20), the soldiers' belts (where visible) have the swag to the right hip. The tribune's belt (Fig. 19:G) seems clearly to depict a ring buckle. His belt is apparently red (dyed leather?), while most of the others are brown. The hanging swags are not coloured like the belt (except Terentius's red-dyed belt), perhaps representing the exposed, lighter, back of the hide. Figure J appears to have two belts, a red one partly covered by a white band which is unbroken at the buckle; could this be a narrow textile sash? The *vexillarius* (F) may also be wearing one. It is notable that warriors and warrior-god figures dressed in flowing desert robes wear a textile waist-sash (Colledge 1976, pls 41, 43, 44; Tanabe 1986, nos 103, 131, 133). Could this feature have been preserved as an ethnic detail on the dress of some of the officers and office-holders (e.g. senior clerks) of *cohors XX Palmyrenorum*?

At least some, and probably many, sets of fittings appear to have included attachments for suspending items from the belt. The Lyons *FELIX UTERE* belt-set has a loop on the underside of one of the 'E's, which was probably for suspending such accessories (Bishop and Coulston 1993, fig. 92; Fig. 31:C), and it was argued above that at least some of the articulated rings from Dura had a similar purpose. It is likely that such

attachments were used to hang items such as purses; almost identical fittings, singly or in pairs, were used to suspend such accoutrements from the broadly contemporary Germanic warriors' waist-belts found at Illerup, Denmark (Ilkjaer 1993, 29, group SAHQ; 83, group SAHT, etc.; see below).

Sword and baldric

The sword was worn as part of regular 'camp dress' shown on tombstones of the period, even when armour and other weapons were not borne. The right to bear arms in public was a fundamental attribute of the status of a soldier, and so swords were routinely worn as a mark of this status and an instrument of authority.

By the third century, the weapon was usually a longsword (swords and scabbards are discussed in detail on pp. 140–44). It was suspended from a baldric, a broad leather belt with characteristic fittings which were often elaborately decorated.

Terentius and his men are depicted wearing such sword-belts (Fig. 20). The baldric was slung over the right shoulder, the sword hanging on the left side, worn quite high with the pommel around armpit level, so that the long blade did not trip the wearer. It normally hung vertically, but the position of the scabbard slide (strap-loop), often not far above the centre of gravity, allowed it to be readily swung forwards for drawing and sheathing. Terentius is apparently wearing a broad baldric of red leather. The pommel of the sword is clearly visible. Several other soldiers are wearing brown baldrics.

Sword-belts seem to have been of various widths, perhaps relating broadly to the weight of the sword. This is deducible from surviving baldric fasteners, which were presumably no wider than the belts to which they were attached. Examples from Dura suggest belts varied from about 50 mm to at least 80 mm broad. A number of fasteners are about 68 mm wide. Two actual baldrics from Vimose in Denmark were 80 mm and 86 mm wide (Engelhardt 1869, 19, pl. 11; Bishop and Coulston 1993, fig. 12).

Typically, sword-belts possessed two metal fittings: a fastener (usually roughly circular) and a terminal, perhaps with a hinged pendant on the free end (Bishop and Coulston 1993, 130). They sometimes also had additional metal plates or studs which were apparently purely decorative (Fig. 24:B and C). As discussed above, these plates could be exceedingly elaborate.

Consisting of a leather strap approaching 2 m in length, the baldric was broad and parallel-edged where it ran over the shoulder and across the back and chest. On the front, around waist level, it was pierced by the single central tying-loop of the broad fastening plate. Its lower, free end hung in front of the sword scabbard around the left thigh. The other end narrowed greatly as it crossed the back and approached the sword scabbard at the left hip, passing through the scabbard slide, and narrowing further into a thong which was tied to the fastener loop, hidden by the broad chest strap. Depictional evidence shows that the belt passed through the slide without wrapping round the scabbard (Fig. 24:H). Sasanian reliefs suggest that the same was true for their sword-belts too (Herrmann 1981, pl. V). In fact, the scabbard slide was widely used across Asia and depictions do not show the belt wrapping around the scabbard, which would partly defeat the object of the slide, i.e. allowing the sword to be moved along the belt (Trousdale 1975).

It is to be expected that the edges were stitched to control stretching (Fig. 24:A–C). One of the Vimose examples mentioned above retains decorative stitching in the shape of a dolphin on the broad free end, raising the possibility that such embellishment may have been common, but has left no other trace.

The Dura collection seems to contain considerably more fasteners than terminals, probably because terminals and pendants belonging to baldrics are less easy to identify among a mass of similar items, and because some baldrics apparently lacked any metal terminal, as seems to have been the case with the baldric from Vimose mentioned above. The purpose of a terminal and pendant was partly to protect and to weigh down the free-hanging end of the strap and partly simply to embellish it, and so the pendant, and even the end-plate, could be dispensed with. Dura has produced few obvious baldric pendants, but several plates may be from the ends of baldric straps (e.g. **33–36**).

The cloak and brooch

The Terentius painting and the other Dura images show that cloaks were universally worn, the draping showing that they were pinned by a brooch of unclear type at the right shoulder, leaving the right arm unencumbered. Hanging down over the left side of the chest they were consistently (conventionally?) folded back over the left shoulder to expose the left arm as well. The cloak reaches to mid-calf, its lower edge hanging in a curve.

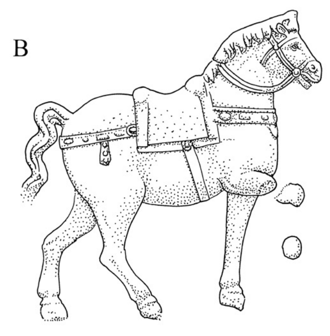
This garment is the well-known *sagum*, the standard middle imperial military cloak, a garment of Gallic origin (N. Goldman 1994b, 231). A large rectangle of woollen cloth, the *sagum* was originally both a Roman soldier's cloak and his bedding on campaign (Wild 1968, 183, 226). The method of draping it seems to have been fairly consistent, and involved at least partly doubling the fabric over before pinning it, to raise the hem and probably to provide a hanging fold which could form a rough hood in bad weather. By the middle imperial period blankets and cloaks were distinct items at least among soldiers, the cloak increasingly being known as the *fibulatorium* (Wild 1968, 226: Diocletian, *Price Edict*, XIX, 54; the apparent synonym *infiblatorium* is attested earlier, around AD 100: Bowman and Thomas 1996, 301–3, Text 1). The name emphasized the brooch which held the cloak together and which was increasingly elaborated as a symbol of imperial service during the middle and later empire.

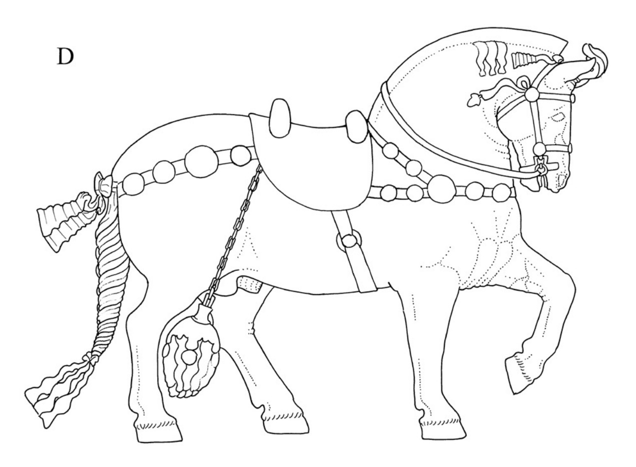
The Roman official's 'military' cloak carried by a servant in the fourth-century Silistra tomb-painting prominently shows its elaborate *fibula*, which evidently 'lived' on the cloak like a button (Brown 1971, fig. 18).

Cloaks provided protection from the sun during daytime, especially over armour, and of course warmth in bad weather and at night. Wool, if it retains its natural lanolin, is rain-resistant and retains its insulation properties even when wet. The lanolin will be lost if the wool is dyed (L. Allason-Jones, pers. comm.), which probably explains the dark shades of most cloaks in coloured depictions: they are natural, undyed wool shades. Among many other things, Roman soldiers will have smelt strongly of sheep. Dark tones were perhaps preferred as they showed the inevitable dirt less (N. Goldman 1994b, 232), while white, which would rapidly yellow in bright sunshine, may also have been reserved for officers, for visual recognition and as a wealth/status mark. The









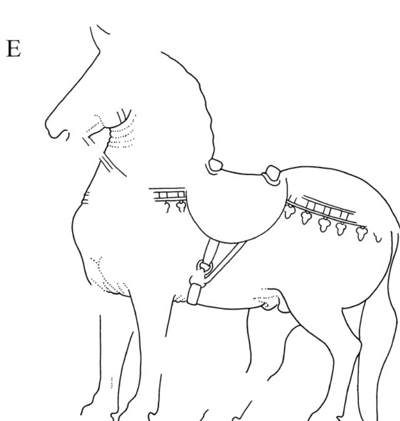


Figure 32 Depictions of horses and horsemen.
A A member of the *equites singulares* at Rome, with his three horses (Rome, Vatican Museums; after Speidel 1994).
B A horse from the Arch of Constantine, early fourth century AD relief.
C Horseman, probably of the equites singulares (Rome, Vatican Museums; after Speidel 1994).
D Third-century Sasanian horse harness on a reconstruction of Shapur I's mount depicted at Bishapur (adapted from reconstructions by Herrmann 1980).
E Roman emperor's (?) horse, from Bishapur III (after Herrmann 1980).

figure in the Deir el Medineh mummy portrait wears a chocolate or red-brown cloak (Luxor Museum 1979, 186–7, no. 290). The cloaks of most of the figures in the Terentius painting were brownish; Heliodorus's is now yellow-brown. Against dark shades, the fibula would have stood out well. Terentius himself (Fig. 19:G), and the figure with the swastika tunic ('K') had white cloaks, the former with purple tassels along the bottom edge; hems were often fringed or provided with corner tassels (Bishop and Coulston 1993, 153 n. 73).

Archaeologically it is hard to distinguish such a cloak from a blanket, but Wild suggests one may be identified at Thorsbjerg. It measures 1.68 m by 2.50 m, plus 'a short fringe on two adjacent sides' and a tablet-woven border (Wild 1968, 183; Schablow 1965).

The many stelae and the Dura images suggest that soldiers wore cloaks most of the time, not just in appropriate weather conditions. The fact that several brooches were found in the mine beneath Tower 19 shows they might have been worn over armour and in battle, too, even in confined spaces (*Rep*. VI, fig. 16).

Accessory items

A number of ancillary items are frequently seen in depictions:

Jewellery: Finger-rings were commonly worn, for functional purposes (sealing documents) and probably ritual reasons, as well as for display. Terentius had a red seal ring on the little finger of his left hand (Cumont 1926, 93; see also Fig. 32:C). One of the soldiers in the Tower 19 mine wore an iron ring (**382**).

There is no evidence for soldiers wearing other pieces of jewellery at this period, such as earrings or items worn around the neck. Had such items been found on or among the pile of bodies in the mine, du Mesnil would surely have mentioned

them, especially as he believed the soldiers to be 'oriental auxiliaries' very unlike 'proper' Roman legionaries in appearance (*Rep*. VI, 197) and was therefore surely on the alert for 'un-Roman' traits; the attention paid to the pendant at the neck of the 'Persian' skeleton proves this (*Rep*. VI, 194). It is likely that brooches and belt fittings, to some degree probably a matter of personal choice, provided what were deemed appropriate foci for display, and were at least sometimes invested with amuletic or apotropaic powers (see above).

Scarf: Though not a regular part of 'camp dress' as seen in representations, a scarf or neckerchief would probably have been a standard item of clothing when in armour, to absorb sweat and prevent armour chafing at the neck. This is probably the *sudarion* mentioned in a graffito at Dura (*Rep*. IV, 98, no. 227).

Purse: It is to be expected that soldiers also carried purses. Coins were found with the skeletons in the Tower 19 mine, many in tightly packed groups (Fig. 14:M1 to M3). In one case at least, such a group was clearly found beneath the armour near the thigh (*Rep*. VI, 197) and was probably the contents of a purse attached to the waist-belt. Loops suitable for attaching such pouches are known on belt-sets (see above). In the Terentius painting, at least one and perhaps two of the figures appear to have such pouches suspended close to the buckle (Fig. 19:J and K). In the third century, purses may have been a universal item of dress but, in representations, any objects attached to the sides or rear of the waist-belt would be obscured by the clothing and the pose of the figures, especially if worn behind the sword.

A purse or pouch may have been most important on campaign when, in addition to money, a soldier would want a number of other personal items readily to hand. The recent remarkable finds of Germanic campaigning equipment made at Illerup, Denmark, illuminate this point. Numerous arms, including belt-sets, were found deposited in a peat-bog, largely dating to around AD 200. These warrior's belts routinely carried a purse/pouch containing a repertoire of items, often including Roman coins, a comb, tweezers, an awl and a strike-a-light set (Ilkjaer 1993, 18, e.g. 29, group SAHQ; 32, groups SAIN, SAIV; 58, group SAIY; 69, group SAKF). A pair of tweezers was found in the Tower 19 mine, perhaps dropped, with the coins, from the purse or belt of a Roman or Sasanian soldier (*Rep*. VI, 192, fig. 15:E).

MILITARY STAFF OR SYMBOL OF OFFICE

Representational evidence shows that various kinds of staff and stylized spear were widely used by military personnel, at least in some cases as visual indicators of rank or office, as in the famous case of the centurion's vine-staff. It appears that, in the middle imperial period, there was a considerable range of types, including elaborate spears, at least some of which seem to have denoted a specific office such as that of *beneficiarius* (p. 51; Figs 24:C and D; 25:E).

No archaeological evidence for these has been identified at Dura (although one may be represented on a brooch, see p. 51), but an example of a well-attested type appears in the upper tier of the Terentius painting, where one figure is seen holding a black staff (Fig. 19:N). It has an expanded top, suggesting a 'T' or 'mushroom' shape. Staffs of this form are quite commonly seen in representations of soldiers and uniformed officials of the third and early fourth centuries. They appear on military stelae (Fig. 32:A): one is carried by an unidentified soldier on a third-century tombstone from Kaiseraugst (Drack and Fellmann 1988, fig. 37), and another appears on the tombstone of Vivius Marcianus of *legio II Augusta* from Ludgate Hill, London (*RIB* I 17 = *CIL* VII 23), showing this to be an empire-wide military fashion. A Tetrarchic example comes from the Luxor paintings, where a figure in a fringed cloak is shown grasping one (Kalavrezou-Maxeiner 1975, pl. 14). Very similar staffs are carried by officials or soldiers in the Piazza Armerina mosaics of the early fourth century. Here, at least, they are shown in the hands of figures of evidently widely disparate rank, suggesting that they may not have had a very specific meaning but rather a general association with official authority (e.g. Carandini *et al*. 1982, figs 16–17, pl. 28). At Dura itself, painted figures in oriental dress (priests?) from the military *mithraeum* are shown holding staffs of this kind (Hopkins 1979, 201–3; *Rep*. VII/VIII, 110–11, pls XVI:1, XVII:1). These representations suggest a considerable degree of variety of size and shape, but the staff seems always dark in colour, often tapers towards the bottom, and has a more or less expanded top. Whether the latter is consistently T-shaped or 'fungiform' is unclear.

Styles and status symbols

There is no evidence that there were detailed regulations determining what Roman soldiers wore in the first half of the third century AD, but there certainly were strong conventions. Soldiers wore tunics, breeches and cloaks, each of characteristic pattern, but forming an unmistakable ensemble. What marked them out above all was their right routinely to bear arms in public, notably a sword. They also wore other items of symbolic value denoting their status as soldiers (e.g. the military belt) and probably other more or less formal symbols of rank, status or office. However, what is most striking in the range of contemporaneous images of soldiers is the standardization of military dress in its general form. It does not seem to be anachronistic, then, to speak of military uniform at this period.

Third-century Roman uniform, as worn at Dura and elsewhere, strikes one as eminently practical – which is unsurprising – but also as considerably heavier and much more encompassing of the body than that of the earlier Roman army, which consisted of a lighter tunic without breeches, and apparently more often lacking a cloak, if representations are trustworthy on the point. Fuller clothing may seem more appropriate for the colder climates of the northern frontiers, but in fact it was also quite appropriate to the East; as we have seen, Dura does, indeed, endure very high temperatures in the summer months, but nights are often chilly and winter can be bitter, with occasional but torrential rains. It is likely that under summer sun, and in rain, wind and dust-storms, the soldiers of Dura were glad enough to be so fully clad, and especially grateful for a substantial cloak. Such clothing will also have suited a garrison largely of Syrians, who were accustomed to being fully clad and not bare-limbed in the old Italian tradition, which even in Italy seems to have been declining during the third century. The change, then, probably reflects the changing cultural background of soldiers as much as practicalities.

The Terentius and Heliodorus paintings and a host of sculptural representations show that the remarkably

standardized military ensemble was worn by all ranks, from private soldier to tribune, and even by the emperor himself when on campaign (Fig. 24:F and G). However, the details of the images, and especially those from archaeological investigation, reveal a fascinating range of fine variations superimposed on the basic template.

The great differences in wealth and social standing between officers and men are likely to have been immediately apparent from the quality of the garments alone; a man like Terentius may be expected to have had clothing made of finer textiles, with richer dyes, and garments which were brighter, better looked after and more frequently replaced than those of rankers. The Durene evidence for uniform fittings also reveals a spectrum of quality in craftsmanship and in value of materials, from copper alloy and bone to showy pieces in silver and ivory. It was obviously wealthier soldiers, probably but not necessarily officers, who owned the matching silver belt-sets and perhaps the silver brooches known from Europe; it is likely that they were specially commissioned, either by their owners, or perhaps as gifts or rewards by superiors.

More specifically, the Terentius scene reveals certain highly visible transformations of the basic uniform, such as the tribune's white cloak with purple tassels in place of the standard brown, the white cloak and swastika tunic of figure K, and the long staff of figure N (Fig. 19). These seem to indicate at least special status; whether they are specific significations of rank or office is less clear. Such symbols are of course attested in Roman society as a whole as well as in the military, from the broad purple clothing stripes and special shoes denoting senators to the equestrian's gold ring, the centurion's vine-staff or the symbolic lance of officials like *beneficiarii*. How far did the repertoire of variation in the details of belt fittings and brooches, and the colours or patterns of embroidery of garments, constitute an overt visual code, a system of symbols with such specific meanings, as opposed to an unarticulated *general* set of cues regarding the wearer's status, wealth and personal taste? The British army of the twentieth century – with its system of permanent regiments as old today as was that of the Roman army in the third century AD – has had a bewildering mixture of standard symbols denoting rank, skills or achievements (from paratrooper wings and medal ribbons to good conduct or wound stripes) besides peculiarities of dress specific to certain regiments, and even to particular individual office-holders, which are deeply expressive of the traditions and histories of particular units. While there is no suggestion that the Roman army had anything much resembling a modern system of standard rank symbols, there is good reason to suspect that, given the elaborate structure of all Roman regiments, the antiquity of many units, and the ethnic diversity of others (immortalized in the names of auxiliary units in particular), complex visual symbolism in dress might be expected.

Some such features may have been intended for overt recognition by outsiders, such as the badges of status of a *beneficiarius* or *frumentarius*, whose specific powers needed to be apparent to civilians; while others may have been intended as signs mainly, or exclusively, understood within the community of soldiers. We saw above that there are fittings which bear the '*beneficiarius* lance' device, perhaps formally as part of the visual signification of such an office (p. 51). Could the swastika device, seen on brooches, a baldric fastener and representations of tunics, have done the same? The prominence of the swastika-wearing figure K in the Terentius painting (Fig. 19) may suggest that this symbol also denoted a particular rank (such as decurion) or a post or status (such as *duplicarius*).

The relative standing of a soldier, then, may have been indicated in a mix of officially recognized ways through a system of visual symbols. It may also have been marked in local, less formal ways through the fashions and traditions of particular units, such as haircuts, perhaps predilections for particular ways of folding the cloak, or stylistic fashions in belt fittings.

As yet, no single complete set of Roman military equipment of the period has been scientifically excavated; the possibility of recovering several sets was lost in the excavation of the Tower 19 countermine bodies, although even with modern techniques the chances of separating out the individual sets from the tangle of bones and artefacts with any confidence would have been limited. As a result, although we know in fair detail how at least some belt-sets were configured, and how some baldrics were embellished, and have a fair idea of the repertoire of military brooch types, we know little about the combinations in which these were worn. The possibility that co-ordinated sets were sometimes worn is suggested by evidence for stylistic connections between brooches, belt-sets, and sword and baldric fittings. For example, one odd asymmetric pierced brooch from Dura (Frisch and Toll 1949, fibula 155) is very similar to plates from a belt-set from Faimingen (Boube-Piccot 1994, pl. L:5). Swastikas are known on brooches and baldric fasteners at Dura (Frisch and Toll 1949, fibulae 137–41; **26**), but it is unknown whether these were actually worn as a matching set, perhaps with a swastika-embellished tunic (Fig. 19:K).

It seems likely that many, if not all, soldiers possessed more than one set of garments and perhaps of belts and fittings. Duplication of other equipment is attested: it is known, for example, that cavalrymen had special equipment for display purposes (p. 70), and a letter from Egypt reveals a soldier owning more than one shield (*P. Mich*., 214). In the 190s, when Severus dismissed the Praetorian Guard, besides routine kit they had special 'ceremonial uniforms' which included 'daggers ... inlaid with silver and gold', and of course belts and 'other military insignia', the nature of which is not specified, but which did not include the sword or the baldric, since they were unarmed at the time (Herodian 2.13.2–3, 9–10). Other soldiers were generally less wealthy than these, but at the very least it is likely that soldiers regularly owned more than one standard tunic at a time, keeping the newest for formal purposes. In peacetime, a standard tunic might be passed through different uses as it became worn and faded, downgraded from 'dress' wear to 'field kit' to 'fatigues'. (Did soldiers wear more than one tunic at a time in very cold weather, or was this a peculiarity confined to Augustus [Suetonius, *Aug*. 82]?) Tunics, cloaks and breeches would need to be regularly replaced after, and probably during, a campaign. Similarly, soldiers may have owned more than one brooch or belt, with a plainer one for routine duties and field service, and the most elaborate pieces reserved for ceremonial occasions. They may also have owned two or more brooches – a showy piece such as a disc-brooch with a stone or pendants for

ceremonial wear, and a bow brooch for normal times and 'combat order'.

Horses, harness and horsemanship at Dura

The Durenes, like many other communities in the Middle East, had a rich equestrian tradition, if the frequent appearance of horses in wall-paintings, graffiti and *dipinti* is any guide. The horse, expensive to acquire and to maintain, was evidently widely used by the elite for hunting and for war (Figs 17, 117). Many of the Palmyrenes, whose horse-archers garrisoned the city before the Roman occupation, were also expert horsemen. Some of the equestrian images at Dura derive from the Partho-Sasanian tradition and may belong to the Parthian period or the brief Sasanian presence in the town (pp. 23–4).

Under Roman rule, Dura was home to a substantial body of cavalry, largely if not wholly of Palmyrene origin, in the *turmae* of *cohors XX Palmyrenorum*. The infantry formations based in the town would also have had horses and pack animals, probably including donkeys, mules and perhaps camels. For heavy haulage, oxen were widely used in antiquity, horses being confined to light vehicles, especially for passengers, partly because of the limitations of contemporary harness design (Casson 1974, 24, 181). *Cohors XX Palmyrenorum* also included a small number of camel-mounted soldiers (*dromedarii*), who would have ridden the indigenous single-humped dromedary (Gauthier-Pilters and Dagg 1981; Dabrowa 1991). However, no archaeological evidence for camel harness has been identified at Dura.

While no skeletal evidence of horses has survived from the site (and no such discoveries were recorded), Dura has produced considerable archaeological testimony for equestrianism and cavalry warfare. Of course there are the spectacular sets of horse armour (also referred to in the literature as armoured trappers or bardings), and items of armour probably specifically for cavalrymen, all of which are discussed in the armour section. There are also some certain, and many probable, equestrian fittings, and indirect evidence for saddles. Nailed horseshoes were used in Roman times (Lawson 1978, 137–40), but it seems that cavalry mounts, which usually operated cross-country rather than on paved roads, were not normally shod. Neither horseshoes, nor the temporary strap-on 'hipposandals' (Lawson 1978, 133–6) which were apparently used when cavalry had to cross extensive hard areas, were identified at Dura.

From the fittings alone, given our current limited knowledge, it is hard to distinguish some aspects of riding, pack-animal, and vehicle harness. Items such as bridles may have differed little between these. In the riding harness category, it is not possible to distinguish between military and civilian equipment from this period, perhaps because few distinctions were made. Horses were valuable and relatively expensive to maintain; few civilians would own them. Within the context of Dura, it is to be expected that the great majority of horses, and many other animals, belonged to the army.

The present catalogue includes all the identifiable artefacts which are believed to be from equipment belonging to riders and their mounts. There are also dozens of small copper alloy bells at Yale, of all sizes up to 50 mm long. Of course bells may have been used for many purposes, but there is little sign among the wider body of equestrian evidence that they were employed on cavalry harness at this period (M. Bishop, pers. comm., but see p. 7), although they may well have been employed on pack harness, or on riding camels, the archaeology of which is less well understood. They are omitted from the catalogue.

Cavalry horses

At any one time *cohors XX Palmyrenorum* alone will have possessed several hundred horses, normally many more than the actual number of cavalrymen. It is likely that there were always a good number of spare mounts and animals in training, with replacement animals arriving continually (Dixon and Southern 1992, 162); certainly some cavalry tombstones show men with two or even three mounts (Fig. 32:A).

Two letters (*P. Dura* 56 and 58) show purchases of new horses were approved by high officials – in the case of *P. Dura* 56 ostensibly by the governor of Syria Coele himself – and were assigned directly to soldiers, apparently at a standard rate of 125 *denarii* (Welles *et al*. 1959, 297–8). Many details of Roman ideas on the qualities to look for in horses are preserved in the literary sources (Dixon and Southern 1992, 163).

A list of cavalrymen of *cohors XX* and their mounts includes interesting details of the identifying features of the animals, including coloration and, apparently, location of brands (*P. Dura* 97; Welles *et al*. 1959, 296–302). The Roman military may have been prejudiced against 'greys' or white horses. Hyland notes that whitish hooves of greys or white-legged horses are known to be less tough than dark hooves (1990, 10). However, in the Dura list, two animals have white hind feet. One horse is described as black, one as mouse-coloured, and others in terms translated as reddish-bay, 'reddish-sooty?' and 'bluish-grey?'. A cavalry mount for the same unit, the subject of a letter received at Dura on 16 March, AD 208, was described as 'reddish, "masked", unbranded' (*P. Dura* 56).

The list *P. Dura* 97 dates from AD 251 and includes three mares and eight males (whether geldings or stallions is not mentioned; stallions, whose tendency to kick and bite could be turned to advantage in war, were usually used by the army: see Hyland 1990, 47, 80–1). One of the mares was four years old, nine other horses were between seven and thirteen (Fink 1971, 341). Six men had recently lost their horses, probably in action.

The sizes of these animals were not recorded, and neither, in most cases, was the breed. Names of at least fifty breeds are listed in classical sources, although what these meant in terms of size, conformation, etc., is largely unknown (Hyland 1990, 11). In the absence of good skeletal data, we can say little about the horses of the ancient Middle East as yet. It is possible that the modern Arab had already appeared, perhaps from Libyan origins; however, its classically concave muzzle profile appears not to have been to Roman taste (Hyland 1990, 24). Parthian and related breeds were very important, Nisaean horses were famous, and Armenian and Cappadocian breeds were also highly prized (Hyland 1990, 15). *P. Dura* 56 C refers to a Cappadocian, a breed described by Oppian as 'swift, spirited, warlike and strong' (Hyland 1990, 15), going to a cavalryman at Dura in AD 208. The breeds of the other animals listed in the documents are unspecified, although Fink suggests that an entry in the list *P. Dura* 97 may be read as referring to a Commagenian horse. It is possible that units like *XX*

Palmyrenorum kept a variety of breeds for specific purposes, such as horse archery, long-distance patrolling, carrying fully armoured cataphracts, or for fast messengers (Hyland 1990, 153; the roster *P. Dura* 100 lists such categories, e.g. *exploratores*).

Horses in the Roman period could be quite large; animals approaching fifteen hands (1.52 m) are attested (Hyland 1990, 25, 68–9; NB the 'hand' is four inches, or 101.6 mm. Measurements are the height at the withers). Even larger animals may well have existed in the East, where 'huge' horses were referred to (Hyland 1990, 15). However, horses of fourteen to fifteen hands (1.42–1.52 m) would have been quite adequate for military purposes. Dixon and Southern suggest that the range of sizes in use, even within single units, may actually have been quite wide (1992, 165, 167). Skeletal material from a number of military sites in Europe represents animals ranging from ten to fifteen hands (1.02–1.52 m: Dixon and Southern 1992, 167; Junkelmann 1990, 250–3). The smallest animals were probably pack-ponies.

On the basis of the Dura horse armour sizes, Hyland infers stocky animals of 14½ to 15½ hands (*c*.1.47 m to 1.57 m). The lack of stirrups itself tended to limit the desirable size of horses, even if very large animals were available. Riders had to vault into the saddle from the ground, clearing the tall saddle-pommels (see below). This is quite feasible, even in armour, with moderate-sized horses, as experiments have shown.

The size of a horse is less important than its conformation in determining its capacity to carry weight (Hyland 1990, 67). Romans preferred robust, rounded animals (Hyland 1990, 5–10), unsurprising considering the loads these animals had to carry. We might estimate the weight of a large cavalryman at about 175 lb (*c*.80 kg), and harness, armour and equipment at another 85 lb (*c*.38.5 kg; Hyland 1990, table 5), giving a total of 260 lb, or almost 120 kg. Comparative cases suggest that horses of the Roman period could readily bear such loads. A British army exercise in Egypt in the 1930s saw horses successfully carrying loads of 300 lb (136 kg) over distances of 90 miles (*c*.145 km) in 12 hours, without loss (Hyland 1990, 154–5). Even more striking is the case of a Persian horse of 14¾ hands which carried a trooper and his kit weighing 315 lb (143 kg) over 800 miles (*c*.1200 km) 'without losing condition' (Dixon and Southern 1992, 170). Fully armoured cavalry may have approached such figures, and were surely operating very close to the limit of their capacity. However, in managing armoured cavalry, load was probably less of a hazard than overheating and the consequent loss of body fluid, which threatened rapid incapacitation (Hyland 1990, 155).

Equestrian equipment

Remains of spurs, bridles and fragments from saddles have long been recognized from Roman contexts both civil and military, but exactly how horse harness was constructed and how it functioned was unclear until recently. In particular, the all-important form of the saddle was not understood. Since 1980 there has been a major advance in our understanding of ancient equestrian equipment and horsemanship, in both the Partho-Sasanian and, especially, the Roman worlds (Bishop 1988; Dixon and Southern 1992; Herrmann 1989; Hyland 1990, 1993; Junkelmann 1990, 1991, 1992, 1996).

Equipage

Apart from a couple of objects believed to be spurs (**325**, **326**), no items of human riding kit have been identified, other than the probable cavalry armour mentioned above. These simple prick-spurs were attached to standard boots by straps. Whether Roman cavalrymen wore special breeches or other garments is unknown. There is no indication that they wore the kind of loose, presumably protective over-trousers or 'chaps' seen in contemporary depictions of riders from Syria to Iran (notably on the Parthian bronze statue from Shami: Curtis 2000, 26–7, fig. 8).

The question of special arms and armour for cavalrymen is discussed elsewhere (p. 70).

Horse harness

Riding harness, then as now, essentially consisted of two components: the bit to control the horse by manipulating its mouth, and the saddle, each with its attendant system of securing straps (Fig. 32).

Dura's evidence for equestrian equipment consists almost solely of metal fittings from harness, and as with the similar (sometimes indistinguishable) fittings from soldiers' equipment, these are mostly single finds with no demonstrable association. However, a group of material all with the provenance E7-W9 may represent some substantial pieces of harness (ivy-leaf pendants, **201**, **207**–**212** and **214**, strap stud **316** and pendant **158**). No fragments of horse harness have been identified among the surviving leatherwork. To identify and interpret the fittings we are therefore dependent on more complete data from elsewhere.

The general archaeological record for horse harness in this period is very good for the Roman world but, as yet, is virtually non-existent for Rome's Eastern neighbours. However, the representational evidence from the Partho-Sasanian world and its neighbours is quite rich, and indicates that, while the basic design and technology of such equipment was the same from Britain to Iran, the details of construction and manner and style of decoration diverged markedly outside the Roman world. The archaeological remains of harness from Dura are largely, if not wholly, identifiable as standard Roman types, closely paralleled in Europe.

While middle imperial Roman metal harness fittings are well attested archaeologically (Bishop and Coulston 1993, 120, 157), no detailed work has yet appeared equivalent to Bishop's on horse harness of the first century (1988), although Junkelmann has produced some very elaborate reconstructions (1996, pls 22, 177, 184–8; see also now Schleiermacher 2000). So far we lack remains of saddles datable to the period, and equally importantly there are hardly any third-century equivalents of the detailed depictions on early cavalry tombstones; horses, when shown, are usually either small and lack detail or are largely obscured by the figure of the soldier (Fig. 32:A, C).

However, the wider archaeological evidence for the middle imperial period provides a very rich resource which has not yet been fully explored. This includes some burials of horses with harness from the Middle Danube region (Palágyi 1989). Of these, the most important are two burials from the Gerhát cemetery, Brigetio (Barkóczi 1948; Palágyi 1989, 130–3). Data from these major finds may be supplemented with more fragmentary remains from Roman military sites. There are also

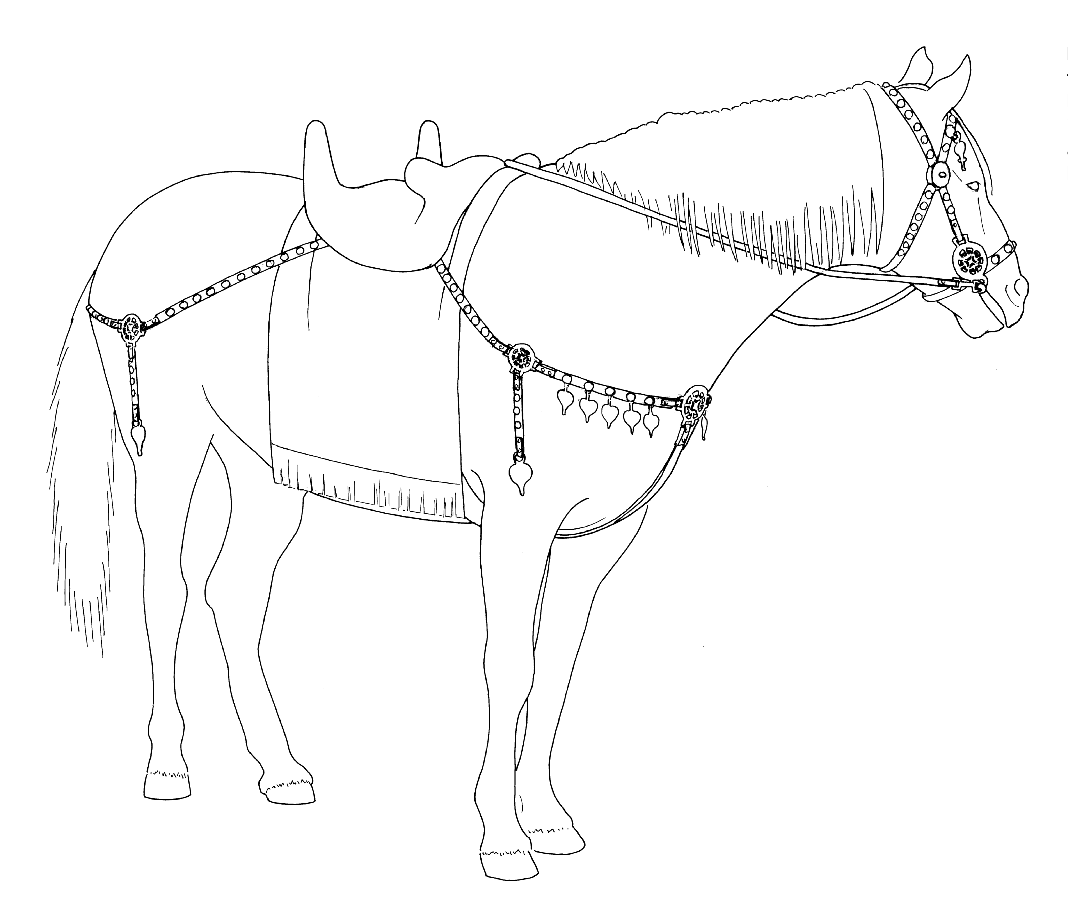


Figure 33 Reconstruction of third-century Roman horse harness, based on finds from Dura and information from representations and contemporaneous European horse-burials.

some other important groups of material, perhaps from civilian contexts, and relating more to vehicle harness, for example, the finds from Celles-les-Waremmes, Belgium (Jacobi 1924, fig. 17), and a major hoard of fittings from a villa at Wange, Belgium (Lodewijckx *et al*. 1993).

It appears from the available evidence that third-century harness, although its principal metal fittings were very different in design from those of the first century, was functionally identical to the earlier types and indicates no significant change in equestrian technology, which should perhaps not be expected before the appearance of the stirrup in post-Roman times.

The Brigetio horse burials show the sheer number and stylistic variety of fittings which might appear on a single set of horse harness, many of which were purely decorative (Barkóczi 1948). Alternatively, these sets might be stylistically co-ordinated, with the same motifs appearing on many fittings; the largely intact harness straps from Celles-les-Waremmes are densely set with copper alloy fittings, composed of sets of stylistically consistent pieces on each strap. A fragment of such a matching set may be represented by **353**.

Bits and bridles

Roman bits are now quite well understood. Various forms were in use, from plain iron snaffle bits to elaborate curb bits (Hyland 1990, 136–40). These might be used in combination with hackamores to provide an effective, if brutal, control over even the most cantankerous horse (Hyland 1990, 140–4). Dura has produced a number of copper alloy cheek-pieces from bits of known Roman provincial types (**327**–**336**), but no actual intact bits; with one fragmentary exception (**327**), the iron has corroded away. Like other large strap junctions, these cheek-pieces are often quite elaborate openwork castings. Some of the strap junctions are probably from bridles, and a number of the studs and small pendants are more likely to be from bridles than from saddle harness (**337**–**360**). Finds of bridles in Pannonian horse burials reveal just how elaborately decorated with copper alloy fittings they could be (Inota, Mözs, Tihany: Palágyi 1989, figs 2, 3, 6).

Saddles

Stirrups were unknown at the time; consequently, it has been widely assumed that the rider's seat cannot have been very secure, and that strenuous cavalry manoeuvres were highly precarious in consequence. Fragments of saddles have long been known. The best general data comes from the early imperial period, for which the considerable archaeological record (notably metal pommel reinforcements and fragments of saddle coverings) is fortunately complemented by the contemporary fashion for highly detailed depictions, notably tombstones of auxiliary cavalrymen. This data was used in a highly successful attempt by Peter Connolly to reconstruct known variants of the Roman saddle, duplicating in all details the archaeological evidence. The reconstructions, which have now been extensively tested on horseback, have demonstrated that in fact the Roman saddle was a highly sophisticated and effective design which gave the rider a seat as firm as any modern saddle (Connolly and Van Driel-Murray 1991).

No fragments of saddle have been identified at Dura, but there is good indirect evidence that versions of Connolly's basic reconstruction were in use. It has long been known that Roman saddles had four tall horns or pommels. Connolly's reconstruction demonstrates the arrangement of these; the rear pair were vertical, and secured the rider's rump, while the front pair were angled outwards, effectively hooking over the horseman's thighs and holding him in place (Plates 12 and 13;

Fig. 33). Remains of such horned saddles have not yet been found in the Roman East, but they were definitely used there: 'Fronto notes slovenly troops at Antioch padding their cavalry saddles, forcing Verus to slit open the horns and remove the stuffing' (Bishop and Coulston 1993, 120: Fronto, *Ad Verum Imp*. 2.1.19). It has now also been convincingly demonstrated that essentially the same kind of saddle was employed in the Partho-Sasanian world (Herrmann 1989). It may have been universal in Eurasia until the development of the stirrup some centuries later.

The clearest evidence from Dura itself comes from horse armour **449**, which possesses two stout leather loops on the rear edge of the saddle-aperture. These were clearly intended to hook over the rear horns of a four-pommel saddle.

Saddle harness

The saddle was secured to the horse's back by three systems of straps: a broad girth strap, supplemented by breast and haunch straps. These served to prevent the saddle sliding forwards or backwards, especially when negotiating gradients. These straps were linked by buckles, plain rings, and metal strap junctions (**337–339**) which provided an opportunity for decorative elaboration, both on the junctions themselves and through the attachment of pendants. Some of the heavier buckles are probably from horse harness, especially girth straps (e.g. perhaps **55**, **56**, **58**, **59**). It is likely that two such buckles were used on a wider girth strap (Hyland 1990, 135).

Non-functional harness components

Harness was often greatly elaborated for display. Straps could be extensively studded, and decorative ones added (Fig. 32:C). Both bridle and saddle harness were often provided with pendants, which might be purely decorative, noise-generating or apotropaic as well (pp. 51–2; Fig. 32:E; **189–191** etc.; **357–360**; see the harness from Celles-les-Waremmes, Jacobi 1924, fig. 17; and the hoard from Wange, Lodewijckx *et al*. 1993**)**. Flashing strap junctions and jangling pendants will have served to enhance the impression made by an approaching cavalryman.

Other horse equipment

By modern standards saddles were probably often ill-fitting, and required additional padding beneath, which both prevented chafing and absorbed sweat (Hyland 1990, 132, 136). Any such pads at Dura may have been made of felt or quilted linen; linen was used for backing horse armour. Saddle-cloths, often quite large and fringed, are often seen on Roman cavalry tombstones. Covering much of the horse's side, such cloths, probably decorated, offered the mount some protection, at least from the dummy projectiles used in training (Arrian, *Ars tactica* 34.8). Sometimes saddle-cloths seem to have completely covered the saddle (Hyland 1990, 135).

Early tombstones show cavalry mounts being paraded on long reins by a groom walking behind. The horse is seen with additional decorative fittings, notably sets of plates hanging from the saddle. Such metal 'saddle plates' are known archaeologically (Bishop 1988, 110, 131–3). It is not clear whether this practice continued into the third century, but certain items at Dura might be saddle plates (**361–367**).

Additional equipment might be attached to horse harness, either routinely or on campaign. Notably, depictions show that

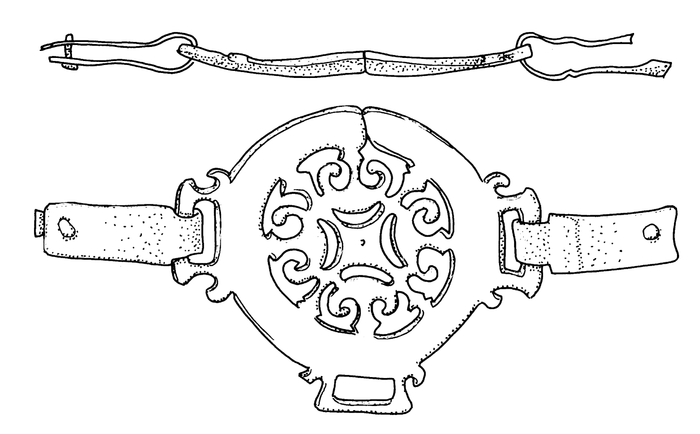


Figure 34 The attachment of cast horse harness strap junctions, etc., to leather straps was apparently by means of riveted metal strips, as seen in this example from Buciumi, Rumania (after Chirila *et al*. 1972, 75, pls LXXVIII, LXXIX). Such thin metal rarely survives intact. Note also the flaw in the casting of the mount. Roman equipment was often of quite low quality and limited robustness.

indigenous horse archers attached a quiver behind their right leg (p. 197; Fig. 117), a probable example of which has been identified (**653**). The bow, when not in use, was cased and hung next to it. Troops in Roman employ followed the same practice, as is seen on the tombstone of Flavius Proclus at Mainz (Speidel 1994, pl. 1).

Design and construction of horse harness fittings

Functionally, third-century cavalry equipment was much the same as that of the better-researched first century, but harness fittings had undergone a radical change in methods of manufacture and styles of decoration, part of the wider changes also seen in the soldiers' equipment discussed above.

Instead of being attached to rings hidden behind large and often gorgeously plated and inlaid *phalerae* as had been the earlier practice, straps were now attached directly to the edges of junction plates, through loops which were integral parts of relatively simple castings. The Dura harness elements and parallels from elsewhere are typically fairly sturdy copper alloy components, usually openwork, and embellished from the contemporary repertoire of ivy-leaf, *pelta* and trumpet motifs (**327–339**; Bishop and Coulston 1993, 120, 157). Harness straps were doubled through the edge-loops, the fastening being reinforced by a thin strip of hammered copper alloy plate, and secured by rivets through metal and leather (Fig. 33). These strips rarely survive at Dura, their thinness resulting in rapid corrosive disintegration (although a fragment remains *in situ* on **356**), while the heavier cast components have survived.

There are no obvious signs of white-metal plating of harness mounts at Dura, but scientific analysis may well show otherwise. Study of fittings from the Wange hoard has suggested the possibility of a hitherto unknown glass-like surface treatment on Roman horse harness (Lodewijckx *et al*. 1993, 96). If the interpretation is correct, such surfaces might have served both decorative and protective purposes, guarding against the corrosive effects of equine sweat.

Equestrianism and mounted warfare at Dura

As with other categories of military artefacts at Dura, those relating to horses and horsemanship are, in general, thoroughly provincial Roman in style, and are mostly closely paralleled in

Europe. The basic equipment was the same as in Europe, but other evidence attests the regional peculiarities of mounted warfare on the steppe.

Mesopotamia, like the wider Partho-Sasanian world, was an area where horsemanship was highly developed and a major part of masculine elite culture. This is reflected in the graffiti and the synagogue frescoes from Dura, which show horses as mounts expressing elite status (e.g. Plate 5), and used both for hunting and for war (Figs 17, 117).

Cavalry, notably horse archers and heavily armoured lancers, were already central to the warfare of the region when the Romans arrived. The horse armour from Dura shows how the Roman military had adapted to local circumstances, largely through the raising of local units, not least *cohors XX Palmyrenorum* itself.

The maintenance of the cavalry arm would have been an enormous part of the life of the military community at Dura, from the supply of horses to the training of mounts and riders and the provision of fodder and pasturage. Not the least demanding task would have been keeping the horses healthy, and doctoring sick and injured beasts. The complexity of cavalry training and horse management has been emphasized by Hyland (1993).

The horse was a major symbol of military power, and Roman harness from Dura and elsewhere shows that the choice of animal, its equipment and decoration furnished a valuable field for impressive displays of military symbolism and of soldierly wealth and taste. It is well known that Roman cavalrymen engaged in elaborate display exercises, which involved special, highly decorated equipment for both horse and man. Arrian, in the famous sections of his mid-second-century *Ars tactica* which deal with cavalry displays and exercises (*hippika gymnasia*), describes the wide range of equipment possessed by cavalrymen, much of it specifically for such training and display. In addition to the fighting panoply, there was a complete second exercise/display panoply for both horse and rider. This included decorative full-face helmets, and 'shields, not of the kind used for battle, but lighter in weight (since their exercises are directed towards speed and elegance) and multi-coloured [or 'cunningly worked'] to look attractive' (Arrian *Ars tactica* 34.5: trans. F. Brudenall, in Hyland 1993, 72). With the possible exception of some fragments perhaps from such a helmet (**377**), the only items plausibly identified as evidence for these 'cavalry sports' are the painted shields (e.g. **616**, **617**).

With regard to combat equipment, it is likely that during the third century most helmets, body armour, and other weapon designs were common to both infantry and cavalry (pp. 102, 113). However, special cavalry arms identified among the Dura finds include the larger swords and the head of a mace (**647**) which corresponds very closely to a cavalry weapon clearly described by Arrian (*Ars tactica* 4.9). Greaves (**447**, **448**) and limb defences (**441** to **446**) are also fairly surely intended for horsemen. Arrian refers to thigh-guards, although they seem to have been worn by non-Roman cavalry in his time (*Ars tactica* 4.1). A gruesome counter-measure against cavalry was the caltrop, a tetrahedron of metal spikes which always fell with one point upwards (**370**), a simple but effective 'area-denial' weapon ancestral to the modern landmine.

The Dura evidence is wholly consistent with the belief that, in the East more than elsewhere, much cavalry combat consisted of missile warfare, through the use of bows and javelins. However, it is evident that, even if horses refuse to collide with standing lines of infantry (Goldsworthy 1996, 230), the four-horn saddle made for wickedly effective employment of either longswords, or the long lance depicted at Dura and elsewhere, against other cavalry or disordered infantry (Plate 4; Figs 22, 23).

All this equipment, decorative and functional, is physical testimony for a field of great complexity, requiring high levels of technical expertise and skill. While it is clear that the horsemen of mixed *cohortes equitatae* like *XX Palmyrenorum* were not usually expected to be as expert as the dedicated cavalry *alae*, as Hadrian's address to the troops at Lambaesis makes clear (to the cavalry of *cohors VI Commagenorum equitata*: *CIL* VIII 2532 and 18,042; *ILS* 2487 and 9133–5; Lewis and Reinhold 1966, 509), it is likely that at least some of the riders recruited from an equestrian people like the Palmyrenes could approach the levels of skill attested by Arrian. In certain cavalry exercises, the best horsemen could discharge fifteen or even twenty javelins at a single pass through a defined target area (Arrian *Ars tactica* 40.8–11; this must surely imply both small projectiles and use of a javelin holster). At least some cavalrymen could leap onto the back of a galloping horse in full armour (Arrian *Ars tactica* 42.3). Josephus describes a galloping auxiliary cavalryman grabbing a fleeing man by the leg, hauling him across the saddle, and carrying him to Titus (*BJ* 5.161–3). The new practical understanding of the Roman saddle makes the veracity of such stories much more plausible.

Dress and harness fittings at Dura in their empire-wide context

In general, the assemblage of metal fittings (including brooches), the component of the assemblage pertaining to dress most easily comparable with data from elsewhere, is clearly part of the same population of forms and styles seen at broadly contemporary sites across the Roman world, especially along the frontiers. Few types at Dura are entirely unfamiliar. Individually, most items are very well paralleled in Europe and Africa; they are either indistinguishable, or variants on known themes which would excite no surprise had they been found in Scotland or Morocco. The assemblage does contain some interesting apparent peculiarities; however, caution must be exercised before particular emphasis is placed on any of these. Beyond the difficulties of deciding the boundaries between civilian and military artefacts, we are still very far from having a complete picture of the repertoire of fitting types used by the Roman army during the second and third centuries, still less of the distribution of particular types or motifs, even for areas as extensively researched as Britain and Germany. We cannot yet be sure that certain types thought to be exclusive to certain areas really are so; it may be that on other frontiers, they simply have not yet been recognized or published. A good example of this is the button-and-loop fastener (Wild 1970), once thought to be exclusive to the north-western empire, more and more examples of which are now being recorded elsewhere.

These caveats notwithstanding, it is currently possible to say that Dura has produced some items which are to be found

across the whole empire, either very commonly (e.g. certain types of bow brooch) or quite frequently (such as openwork baldric mounts), and a wider range of slightly less common types, which may prove to be regional or very local, or may yet be recognized to possess a very thin, empire-wide distribution. It is not yet possible, then, to be very definite about how typical or anomalous an assemblage like Dura is in relation to the wider context; we need good quality data from more sites, especially in the East.

Leaving aside the ambiguities of brooch types, it seems to me that all, or almost all, of the major categories of dress and harness fittings known elsewhere, such as those of Upper Germany presented by Oldenstein (1976), are attested at Dura. The differences between the assemblage from Dura and those from Europe, in the range and exact conformation of subtypes attested, are fairly subtle, and may be largely the result of statistical factors; it is clear that, within the major categories of studs, terminal, baldric and belt plates, etc., there is a great deal of minor variation, with hundreds of types known to have been in circulation. The repertoire of known variants is so large that the apparent absence of some forms seen in Germany, for instance, could be the result of mathematical chance; if they were originally known but rare at Dura (e.g. a fraction of 1% of the total population of fittings), it would be unsurprising if they happened not be represented in the relatively tiny sample surviving today. That said, the apparent absence of one form well-known elsewhere – the so-called *beneficiarius* lance-shaped pendant – is probably real, helping to confirm that they are a German regional type (p. 51). Some forms of strap studs known in Germany are also absent (Oldenstein 1976, nos 543–63), and it is interesting that no punch-inscribed disc- or *tabula ansata*-shaped label plates have been identified (Oldenstein 1976, nos 755–79). However, this does not amount to any very clear pattern of distinctiveness.

Apart from the modest anomalies noted, the assemblage from Dura is, all in all, surprising in that it is generally so unremarkable; it is largely a variant on a well-known theme, albeit incorporating a number of types which – so far – do appear to be unique to Dura, and which would therefore look out of place in the West, such as, for example, the shield-shaped baldric fasteners. Twisted-top pendants (e.g. **206** etc.) are not common in the West, and some of the strap terminals would look anomalous in Britain or Germany (L. Allason-Jones, pers. comm.). Could the peculiar terminals like **166** either belong to local civilian dress or perhaps to a local military fashion, maybe specifically part of the dress of *cohors XX Palmyrenorum*? Their general size and weight is consistent with other fittings thought to be from military belts.

Future research is likely to reduce, though not eliminate, some apparent peculiarities of the Dura material, and to throw others into sharper focus. For example, it may be that the shield-shaped baldric fasteners prove to be much more widely distributed, but that the thinness of the metal makes their survival rare and the identification of their fragments hard. On the other hand, if terminals of the Dura type (e.g. **166)** existed outside Syria, it is likely that examples would have been published by now; more work may show if they are a widespread Syrian regional type or a truly Durene form.

It is evident that the detailed chronology of particular fittings and of combinations such as belt styles is as imperfectly understood as are their exact uses, origins and distributions. It is unclear to what extent the evidence represents a broad range of contemporaneous fashions – perhaps reflecting distinctions between 'service' and 'ceremonial' dress, between ranks or offices, or variations in personal taste and wealth – as opposed to diachronic changes too complex and swift for us to discern from even this relatively closely-dated body of material. It certainly appears that we are dealing with a field of material culture full of spatial and temporal complexity and elaborate meanings, but so blurred and further obscured by processes of deliberate or accidental selection and deposition, and by the full range of post-depositional factors, that there is a limit to the extent of reconstruction possible; however, that limit is far from having been reached. Paradoxically, one of the most urgent tasks is research into non-military costume, in order to place the military assemblage into clearer context.

Catalogue: Fittings from military dress and horse harness

Baldric fittings

1
Copper alloy shield-shaped baldric fastener
Provenance unknown
Yale no. 1938.3427
Dura no. unknown
Length 94 mm, width 68 mm

An almost perfect model of an oval shield complete with a fragmentary boss, apparently a separate component, attached by the correct number of four rivets. The empty central aperture was for a metal loop which pierced the baldric strap (see **3**).

No close archaeological parallels are forthcoming, but a similar fastener appears to be represented on a third-century military tombstone (Fig. 24:B). See a shield-shaped brooch, with coloured enamel representing painting, from a third-century context at Verulamium (Wheeler 1936, 209, fig. 45:35).

2
Copper alloy shield-shaped baldric fastener
Provenance unknown
Yale no. 1938.3429
Dura no. unknown
Length 83 mm+, width 67 mm+

Copper-coloured alloy. Lacking the central fastening-loop. There is a tiny rivet hole on either side of the central aperture, probably for a separate boss like that on **1**, and two more of unknown function, away from the central axes.

3
Copper alloy shield-shaped baldric fastener
Provenance: Tower 22
Yale no. 1938.3425
Dura no. H612
Length 86 mm, width 64 mm

The boss seems to be a separate component from the main plate. The fastening-loop, a bent strip of copper alloy, pierces both and is bent outwards over the boss. The whole was then locked by filling the boss with what appears to be lead. The plate is decorated with inscribed lines, one parallel with the edge perhaps representing the edge-binding of actual shields. The inscribed concentric rings round the boss echo the painted decoration of the oval shields found at Dura.

4
Copper alloy shield-shaped baldric fastener
Provenance unknown
Yale no. 1938.3433
Dura no. unknown
Length 82 mm, width 67 mm

With a repoussé flanged boss at the centre, it is slightly dished as real shields seem to have been. There is no sign of attachment, which was probably by means of a loop soldered to the rear of the boss. There are traces of an inscribed line parallel with the edge, representing the edge-binding of the shield-board.

5
Copper alloy shield-shaped baldric fastener
Provenance: D7-D8
Yale no. 1932.1641
Dura no. E1384
Length 75 mm, width 68 mm+

Shield-shaped, following the later, more circular pattern of shield-board. Apparently a one-piece casting with a broken loop, probably originally D-shaped, attached behind the raised central boss by a cylindrical projection. There are two compass-scribed circles around the boss, and another inscribed line parallel with the stress-cracked edge.

A similar piece was found at the Saalburg (Oldenstein 1976, no. 1116).

6
Copper alloy shield-shaped baldric fastener
Provenance: L7-W1
Yale no. 1933.666
Dura no. F440
Length 72 mm, width 70 mm

Possibly from the Tower 19 countermine. Made of a yellowish alloy, in three components: plate, boss and fastening-loop of bent strip. The whole is fixed together by the filling of the boss with lead (?), probably poured through the small aperture at the centre of the boss. The piece surely imitates the form of the broad oval shield. The inscribed rings probably represent painted decoration and edging.

7
Copper alloy shield-shaped baldric fastener
Provenance: G1
Yale no. 1932.1640
Dura no. E1237
Length 75 mm, width 74 mm

Lacking signs of attachment which was probably via a loop soldered inside the repoussé boss. Decorated using compasses, pivoted on the hole at the centre of the boss.

8
Copper alloy shield-shaped baldric fastener
Provenance unknown
Yale no. 1938.3431
Dura no. unknown
Length 80 mm, width 78 mm

Yellow alloy, slightly dished. Lacking any attachment, which may have been a loop fixed through the central aperture in the raised boss. Decorated with an inscribed ring around the centre (perhaps representing the flange of a shield boss), and two narrow rings flanking a wide, shallow runnel around the edge.

9
Copper alloy shield-shaped baldric fastener
Provenance: L7-W26
Yale no. 1938.3472
Dura no. F2187
Length 64 mm+, width 65 mm+

Corroded, and lacking the loop. Possibly from the Tower 19 countermine. A rather shattered piece, now lacking any fastening. Decorated with inscribed rings around boss and edge.

10
Fragment of copper alloy shield-shaped baldric fastener
Provenance unknown
Yale no. 1938.3388
Dura no. unknown
Length 73 mm+, width 29 mm+

Part of the flange of a fastener like **7**, bearing three concentric inscribed rings. Apparently slightly dished.

11
Copper alloy (?) shield-shaped baldric fastener
Provenance: G5-27
Location unknown
Dura no. G1532
Diameter 65 mm

Known only from a card bearing an ink sketch preserved at Yale.

Paralleled at the Saalburg and Feldberg (Oldenstein 1976, nos 1123–4).

12
Possible shield-shaped copper alloy baldric fastener
Provenance unknown
Yale no. 1938.3536
Dura no. unknown
Diameter 30 mm+

Identification doubtful. A heavily corroded and much eroded object with a fastening-loop behind a central boss which is surrounded by a flange which was perhaps originally considerably more extensive.

13
Copper alloy shield-shaped (?) baldric fastener
Provenance unknown
Yale no. 1938.3440
Dura no. unknown
Length 96 mm, width 95 mm

Traces in the corroded surface of the central area, around the aperture pierced by the ends of the fastening-loop, may suggest that a separate boss was originally soldered on. The scalloped edge was further embellished with triads of punch-marks, now apertures, but it is unclear how far this is due to later corrosion and/or cleaning of the thin metal.

A '*phalera*' with a loosely similar pierced edge is in Chesters site museum on Hadrian's Wall.

14
Copper alloy baldric fastener
Provenance unknown
Yale no. 1938.3428
Dura no. unknown
Length 68 mm, width 64 mm

A plain oval plate, with a broken, probably originally D-shaped

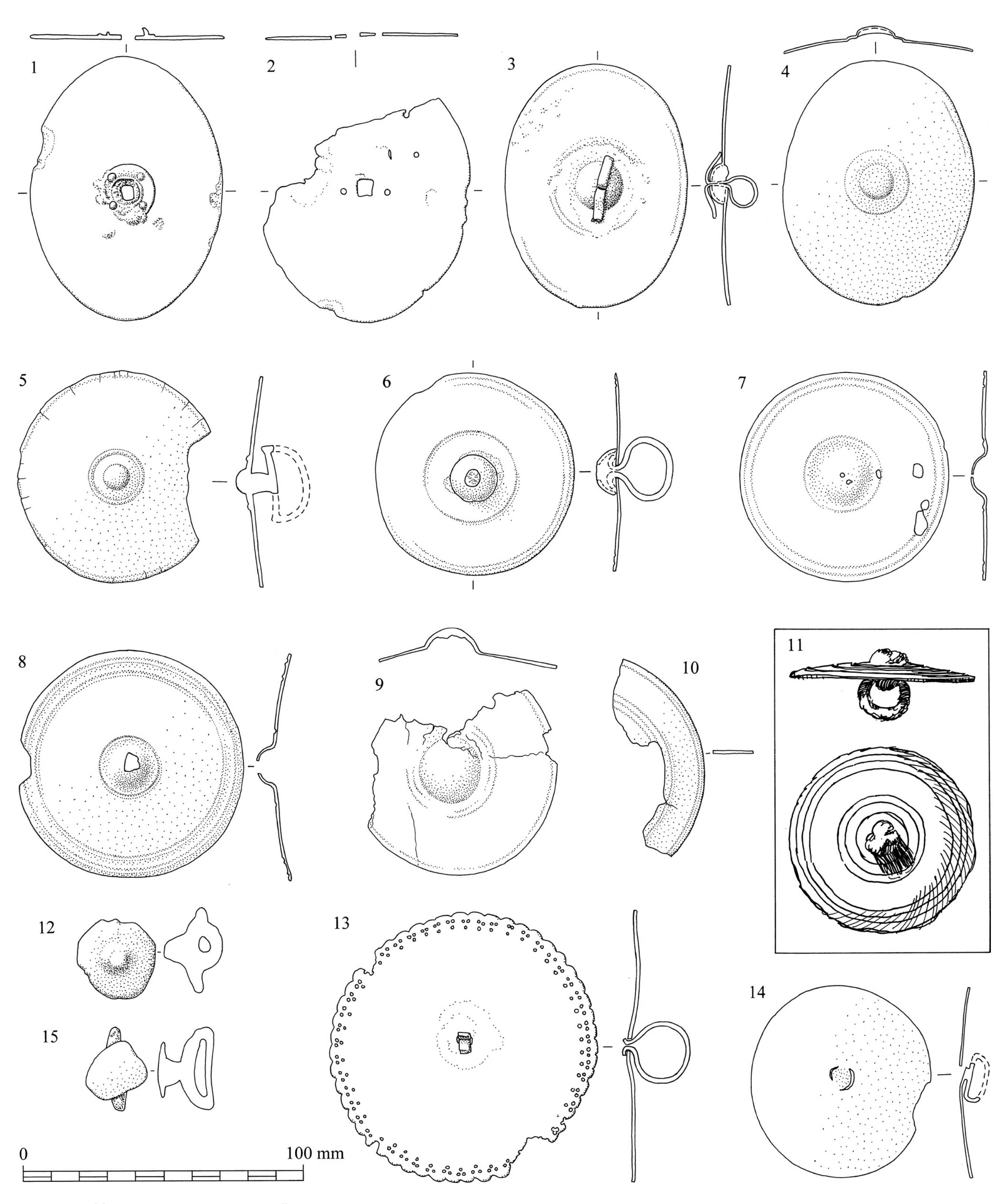


Figure 35 Baldric mounts, **1** to **15**. Copper alloy.

fastening-loop on the back. The loop has been partly wrenched off.

15

Fragmentary copper alloy baldric fastener

Provenance unknown
Yale no. 1938.2467
Dura no. unknown
Length 30 mm+, width 23 mm+

The plate, probably originally a plain oval, is mostly broken away. The piece appears to have been a single casting. The D-shaped fastening-loop is intact.

16

Copper alloy baldric fastener

Provenance unknown
Yale no. 1938.3430
Dura no. unknown
Length 92 mm, width 83 mm

The generally oval outline may again suggest a general affinity with the fasteners which more clearly represent shields. The connection is strengthened by the 'engrailed' edge, similar to those on shield bosses **603** and **604**. The face appears to be completely plain. The reverse reveals two eroded stumps of what seem to be the roots of a fastening-loop, now lost.

17

Silver openwork baldric fastener

Provenance: J7-W2
Yale no. 1935.33
Dura no. G1892
Diameter *c.*80 mm
Frisch and Toll 1949, 2 and pl. VII, unnumbered

An elaborate casting in what appears to be good silver. The plate was attached to the baldric via a round loop. This was a

separate component fixed through a central aperture in the disc. The design of *peltae*, S-shapes and tendrils is in carefully file-finished openwork. Its radial symmetry resembles painted shield designs such as that on the back of **617**. Roundels of this type were probably complemented by matching baldric terminal plates and hinged pendants.

Similarly decorated openwork sets, although usually in copper alloy and not quite so finely finished, are well known, especially in Europe, e.g. in Upper Germany (Oldenstein 1976, 223–5, nos 1092–1101) and Dacia (Petculescu 1991). A splendid white metal baldric plate from such a set was found at Silchester (Boon 1974, fig. 8:4). They could consist of abstract or lettered designs (Allason-Jones 1986; Bishop and Coulston 1993, 130, 135, fig. 91; e.g., Aldborough: Bishop 1996, nos 422, 425–7). Africa has produced an example of the well-known type with a central eagle (Thamusida: Boube-Piccot 1994, no. 208); Syria has also produced a variant (Damascus National Museum, no. 2527/6995). Elaborate openwork examples containing human figures are also known, so far only from the East. Syria itself has produced one depicting Hercules from Tell Barri (Peccorella 1987, fig. 50), while another unpublished piece, depicting Mithras, is displayed in Damascus National Museum (no. 2592/7126). A further example, with lettering mentioning *legio VI Ferrata* and depicting the she-wolf and twins, was found in Egypt (Southern and Dixon 1996, 108, fig. 33). The National Museum, Damascus also displays a splendid openwork baldric fastener depicting a god, probably Jupiter Dolichenus, in excellent silverwork even finer than this piece (numbered 7197).

18

Copper alloy openwork baldric fastener
Provenance unknown
Yale no. 1938.2169
Dura no. unknown
Diameter 74 mm
Frisch and Toll 1949, pierced bronze no. 6

Now broken into three pieces, but almost complete. The threefold radial symmetry may be inspired by the La Tène-style pieces like **24**, **25** and **27**. Cast in a single piece, including a central fastening-loop on the back.

Similar pieces, with four outward-facing *peltae*, are known from Carnuntum (*RLÖ* IX, fig. 54: 5) and Zugmantel (Oldenstein 1976, no. 1134).

19

Copper alloy openwork baldric fastener
Provenance unknown
Yale no. 1938.2170
Dura no. unknown
Diameter 66 mm
Frisch and Toll 1949, pierced bronze no. 5

A single-piece casting of fastening-loop and openwork plate, the latter exhibiting a sixfold radially symmetrical pattern of bars and *peltae*.

For a general parallel for a large, pierced, copper alloy disc, probably a baldric fastener, from Richborough, see Bushe-Fox 1928, 50, no. 64, pl. XXIII.

20

Copper alloy openwork baldric fastener
Provenance unknown
Yale no. 1938.2168
Dura no. unknown
Diameter 55 mm
Frisch and Toll 1949, pierced bronze no. 4

A single-piece casting in openwork exhibiting eightfold radial symmetry of rather debased ivy-leaves, very much like that on the back of shield **617**.

There is a parallel from Kastell Pfünz (*ORL* B, VII, no. 73, pl. XIII:26).

21

Copper alloy openwork baldric fastener
Provenance: G1-23
National Museum, Damascus
Dura no. E439
Diameter 63 mm, thickness 5 mm (with loop 18 mm)
Frisch and Toll 1949, pierced bronze no. 8

The published photograph clearly shows a central loop, consistent with identification as a baldric fastener. The 'heart-shaped' patterns, based on ivy-leaves, recall the design on the back of shield **617.**

22

Probable copper alloy openwork baldric fastener
Provenance: Mithraeum J7
National Museum, Damascus
Dura no. I16
Diameter 52 mm, thickness 4–4.5 mm
Frisch and Toll 1949, pierced bronze no. 12

The published photograph appears to show a central fastening-loop behind the centre, suggesting that this is a baldric fastener. Frisch and Toll record that: 'The central opening . . . when found held a cotter pin . . . All edges are carefully beveled.' The decoration is a variation on common themes, although no exact parallel is known to me.

23

Probable copper alloy openwork baldric fastener
Provenance: C4-28
National Museum, Damascus
Dura no. I567
Diameter 47 mm, thickness 4.5 mm
Frisch and Toll 1949, pierced bronze no. 14

Frisch and Toll consider the design to consist of 'eight strongly debased "peltae" ' around the perimeter, and note that 'there are no traces of the fastening device left'. However, the damage to the centre is strongly suggestive of a central fastening point, and the general similarities fit best with identification as a baldric fastener.

24

Copper alloy openwork baldric fastener
Provenance: J8-W11
Yale no. 1938.2179
Dura no. H278
Diameter 53 mm, thickness 3–5 mm (20 mm with loop)
Frisch and Toll 1949, pierced bronze no. 2

Exhibiting threefold rotational symmetry, in La Tène-derived style. There is an almost identical piece from Kastell Böhming (Oldenstein 1976, no. 902).

25

Copper alloy openwork baldric fastener
Provenance: J7
Yale no. 1935.41
Dura no. G1886
Diameter 53 mm, thickness 3–8 mm
Frisch and Toll 1949, pierced bronze no. 1

Frisch and Toll record: 'Fastening loop cast in one with the disc. With the exception of the broken-off loop the piece is complete.' The design consists of 'strongly plastic, trumpet-shaped' motifs.

A variation on **24**. The general La Tène-derived style and geometry are similar to pieces from the Brigetio horse harness finds (Barkóczi 1948, 178, pl. XXXI:1–2).

26

Copper alloy openwork baldric fastener
Provenance unknown
Yale no. 1938.2155
Dura no. unknown
Diameter 41 mm+, thickness (including loop) 18 mm
Frisch and Toll 1949, pierced bronze no. 7

An openwork swastika in a ring, with knife-cuts around the perimeter. Most of the ring is lost. Swastikas, rotating both ways, are a common device on brooches at Dura (Frisch and Toll 1949, brooches 137–41). A baldric fastener of this form, but with the swastika rotating the other way, was found at an unknown spot near Belgrade (M. Vujovic, pers. comm.).

27

Pierced copper alloy baldric fastener (?)
Provenance: G6-A16
Yale no. 1932.1483
Dura no. E1395
Diameter 54 mm, thickness at centre 10 mm
Frisch and Toll 1949, pierced bronze no. 9

The rear bears the scars of four attachment pins, one in the centre and one behind each La Tène-inspired tendril. Its identification as a baldric fastener is doubtful. However, it bears structural similarities to **28**, which does seem to be a type of fastener.

There is a close parallel from London (Museum of London 1935.49.13.620: L. Allason-Jones, pers. comm.).

28

Copper alloy baldric fastener (?)
Provenance unknown
Yale no. 1932.1563
Dura no. unknown
Diameter 45 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 10

Frisch and Toll record that 'the central circular opening held a cotter pin, the remains of which still adhere to the opening . . . there are three small rivet heads, broken off at the rear . . .'

Similar to **317** in decoration and form. Also resembles baldric fasteners from Heftrich and Zugmantel (Oldenstein 1976, nos 1110–11).

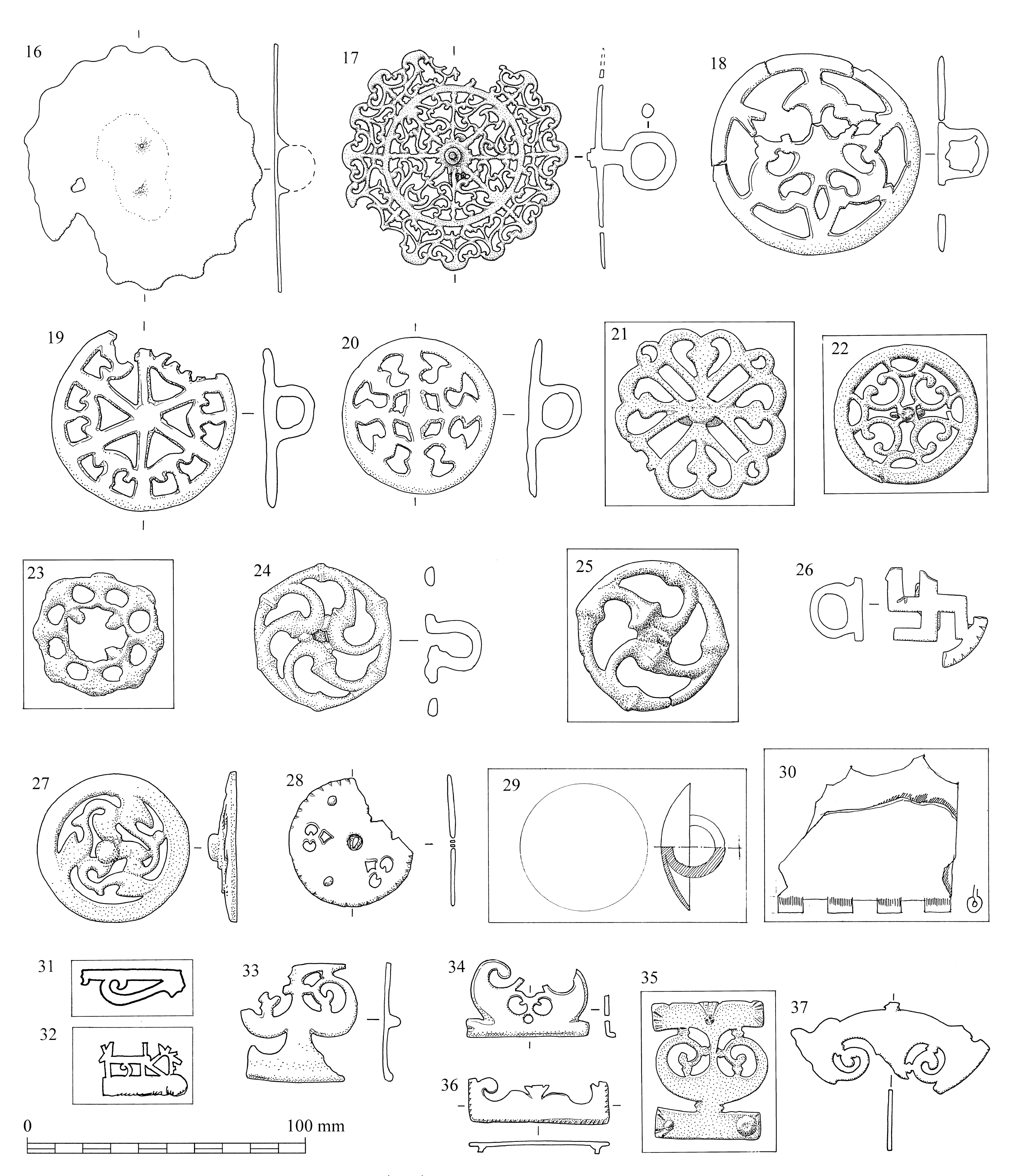


Figure 36 Baldric mounts, **16** to **37**. Copper alloy, except **17** (silver).

29

Possible copper alloy baldric fastener

Provenance: G1-street
Yale no. 1932.1397*
Dura no. E1126
Diameter 45 mm
*From the site-register. Actual whereabouts unknown. Details and a schematic drawing from a site card preserved at Yale. It appears to be domed, with a fastening-loop on the back.

30

Copper alloy baldric plate (?)

Provenance: G1-64
Location unknown
Dura no. E1202
Length 60.5 mm

A large bronze plate, doubled over and cut to form one side of a hinge. Perhaps designed to attach a hinged terminal to the broad end of a baldric. It is generally similar to a piece from Mauretania (Thamusida: Boube-Piccot 1994, no. 209); however, its construction is unparalleled in detail, and the identification is doubtful.

31

Pierced copper alloy baldric plate or pendant (?)

Provenance: Main Gate (?)*
National Museum, Damascus
Dura no. K217
Length *c.* 35 mm (estimated from photograph)*

* Frisch and Toll 1949, pierced bronze no. 83. Appears in Matheson 1992, fig. 17, which says it is from block G.

Frisch and Toll note that this 'seems to have consisted of a bar with confronted spirals on one side . . .'. This is consistent with the frame and openwork decoration of either a baldric plate or a pendant such as those from Zugmantel (Oldenstein 1976, nos 1099, 1100).

32
Pierced copper alloy baldric fitting (?)
Provenance: J7-W1
National Museum, Damascus
Dura no. G1793 (part of)
Dimensions unknown
Frisch and Toll 1949, pierced bronze no. 81

Perhaps a fragment from an openwork baldric plate or pendant, like the '*numerum omnium*' types (see **17** for parallels).

33
Copper alloy baldric terminal (?)
Provenance: N8-W
Yale no. 1938.2159
Dura no. K599
Length 42 mm, width 41 mm, thickness 2.5 mm
Frisch and Toll 1949, pierced bronze no. 36

The shape suggests a reinforcement to a square-ended strap, possibly from a baldric.

The double volute and bar is reasonably well paralleled on pieces from Feldberg and Saalburg (Oldenstein 1976, nos 429–30)which are probably from baldrics. There is a similar piece from the Hague, Holland (Waasdorp 1989, 162–3, fig. 5), and a fragment of another from Brancaster (Hinchliffe and Green 1985, 209, fig. 88:31). See also a piece from Carnuntum (*RLÖ* IX, fig. 18:9).

34
Copper alloy baldric terminal (?)
Provenance unknown
Yale no. 1938.2150
Dura no. unknown
Width 43 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 38

The shape suggests a reinforcement to a square strap end. The decoration is like the circular plaques **28** and **317**;the widths also match well.

Closely similar to pieces from Saalburg and Zugmantel (Oldenstein 1976, nos 650–2).

35
Copper alloy baldric terminal (?)
Provenance: E5-W*
National Museum, Damascus
Dura no. K688*
Length 50 mm, width 41.5 mm, thickness 3 mm
Frisch and Toll 1949, pierced bronze no. 37
*Details from site sketch; however, the site-register records that 'K675–700 do not exist'.

Attached by three rivets, two at the ends of one terminal bar, one in the centre of the other.

The exact form is not paralleled, but a *pelta* with a single bar is known from the Saalburg (Oldenstein 1976, no. 650).

36
Copper alloy baldric terminal (?)
Provenance unknown
Yale no. 1938.2109
Dura no. unknown
Length 49 mm, width 15 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 59

The shape suggests a reinforcement to a square strap end. Attached by projecting pins on the reverse.

There is a near-perfect parallel from Aldborough (Bishop 1996, no. 439), and one close in form from South Shields (Allason-Jones and Miket 1984, 230, 3.814).

37
Pierced copper alloy baldric pendant (?)
Provenance: E4-7
Yale no. 1938.2093
Dura no. F83
Width 70 mm+, height 33 mm+
Frisch and Toll 1949, pierced bronze no. 75

The design consists of a *pelta* with pierced spiral ends. *Contra* Frisch and Toll, it is suggested that the small tab at the top is from a fastening-loop, and that the lower edge swept down to a pointed terminal. It is similar in size and shape to a pierced terminal from Vindolanda, which is probably from a baldric (Bidwell 1985, 119, no. 16, fig. 40).

Buckles and fasteners

38
Copper alloy ring buckle
Provenance: G4 main street*
National Museum, Damascus
Dura no. K598 (?)*
Width 21 mm
* Site number and provenance from Yale records. However, the site-register gives K598 as 'designed [*sic*, i.e. painted] pot-sherd', and so both are suspect. Known from a site sketch and photograph at Yale (Damascus photograph N 144).

It is too tiny to be from a waist-belt. A similar very small ring buckle is known from the Saalburg (Oldenstein 1976, no. 1055).

39
Copper alloy ring buckle
Provenance unknown
National Museum, Damascus
Dura no. unknown
Diameter 29 mm (ring)
Known from a site sketch and photograph at Yale (Damascus photograph N 141)

A ring cast with a button stud and a pointed tongue on opposite sides. It is not too small to be from a waist-belt, but may be from some other object. Fuentes has speculated that similar rings found in the West might be from bags (1991, 93–5).

Parallels are known in both West and East. An almost identical copper alloy ring buckle was 'purchased in Tehran' (Seyrig 1952, 241, fig. 20). Its ring was 30 mm in diameter, and it had a large stud on one side, with a large disc head bearing an inscribed cross. The other side had a 'bird-head' hook, consistent with use with a notched strap. Remarkably similar items are known from Luristan (Louvre AO 20636, AO 20696). Within the Roman empire, a closely similar piece is known from Caerleon (Evans 2000, no. 163).

40
Copper alloy ring buckle
Provenance unknown
Yale no. 1934.705b
Dura no. unknown
Diameter 30 mm, thickness of ring 2 mm

Similar in size to **39**.

41
Copper alloy ring buckle
Provenance: 'J7 debris along wall S. of Pal. Tower' (Palmyrene Gate?)
Yale no. 1933.668
Dura no. F35
Diameter 30 mm, thickness of ring 3 mm

42
Copper alloy ring buckle
Provenance unknown
Location unknown
Diameter of ring 45 mm
Published in Cumont 1926, 261, and pl. XCVII:6

A ring buckle with tongue, 'slightly flattened'.

43
Copper alloy ring
Provenance unknown
Yale no. 1938.2597
Dura no. unknown
Diameter 58 mm

A slightly faceted ring. This and **44–46** are examples of dozens of plain rings of all sizes, possibly from belts, more likely from horse harness.

A similar ring was found among the horse harness in the Frenz wagon-grave (Lehner 1923, pl. III, b: 2).

44
Copper alloy ring
Provenance unknown
Yale no. 1938.2595
Dura no. unknown
Diameter 60 mm

A flat ring, quite roughly cast, possibly from a broad belt or horse harness.

45
Copper alloy ring
Provenance unknown
Yale no. 1932.1465
Dura no. unknown
Diameter 49 mm

A heavily corroded ring, possibly from a belt.

46
Copper alloy ring
Provenance unknown
Yale no. 1929.436
Dura no. unknown
Diameter 60 mm

A slightly faceted ring, possibly from a belt.

47
Ivory ring
Provenance unknown
Yale no. 1934.528
Dura no. unknown
Diameter 52 mm
Russell 1976, 87, no. 9

A slightly faceted ring, probably from a belt. It is slightly laminated and cracked.

There are bone examples from Niederbieber (with a metal tongue) and the Saalburg (Oldenstein 1976, nos 1051–2).

48
Probable copper alloy buckle
Provenance unknown
Yale no. 1938.2986
Dura no. unknown
Length 32 mm

Possibly from a horse's bridle (Junkelmann 1990, fig. 184). There are Roman buckles with similarly shaped loops, e.g. from South Shields (Allason-Jones and Miket 1984, 3.623). A buckle from Straubing may be a related form (Oldenstein 1976, no. 1010).

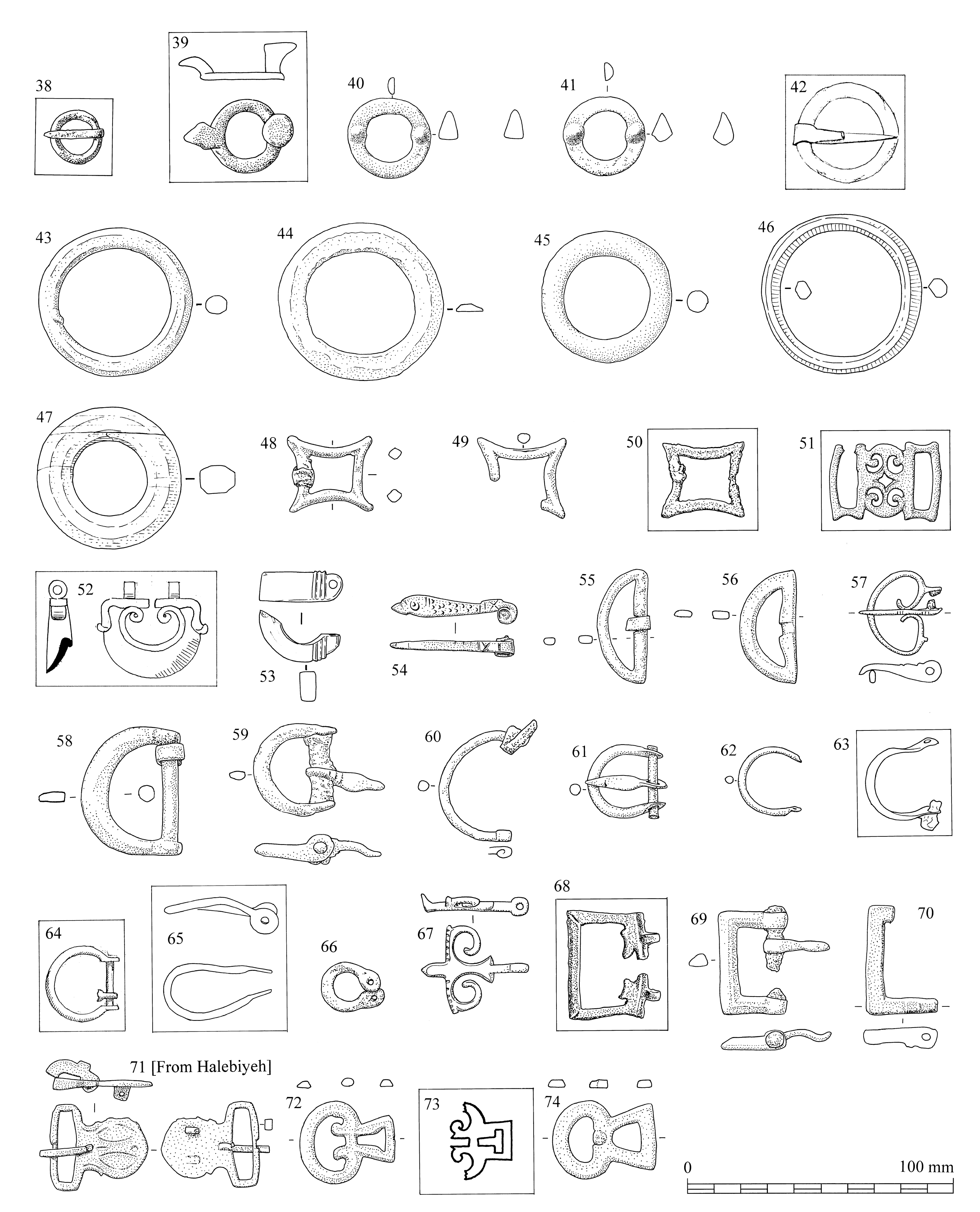


Figure 37 Buckles, **38** to **74**. Copper alloy, except **47** (ivory), **51** (silver?), **53** (bone), and **71** (iron). NB **71** now known to be from Halebiyeh, not Dura.

49

Probable copper alloy buckle
Provenance: N8-W1
Yale no. 1938.2987
Dura no. G1065
Length 33 mm

From either a belt or a bridle.

50

Copper alloy buckle
Provenance: Necropolis tomb 6, XIII
Yale no. 1938.5215
Dura no. G2071
Length 30.5 mm
Published in *Rep.* IX.ii, 33, pl. XXXVII. From an apparently female grave.

51

Silver (?) alloy buckle*
Provenance: G3-C (?)
National Museum, Damascus
Dura no. E763
Length 43 mm, width 30 mm, thickness 3 mm
Frisch and Toll 1949, pierced bronze no. 53
*Rather than copper alloy, according to a site card.

This is a variation on a quite common type of 'frame buckle', e.g. from Pfünz (Oldenstein 1976, no. 1085). A rather similar piece was found with two studs in a grave at Intercisa (Barkóczi *et al.* 1954, pl. XXI:13–15). Another roughly similar buckle was found with two dome-headed studs at Künzing (Fischer 1988, 184, fig. 9:1).

52

Copper alloy buckle loop
Provenance: G3-F
Location unknown
Dura no. E922
Width 40.5 mm
Known only from a sketch at Yale

A buckle corresponding especially to early imperial patterns, although similar heavy buckle types continued to be made into third century (e.g. Wiesbaden: Oldenstein 1976, no. 971).

53

Bone buckle loop
Provenance unknown
Yale no. 1938.610
Dura no. unknown
Length 31 mm

Bone buckle loops are attested elsewhere, e.g. at the Saalburg (Oldenstein 1976, no. 974). There are some reasonable parallels from Vindonissa (Unz and Deschler-Erb 1997, nos 2012–27).

54

Copper alloy buckle tongue
Provenance: M7-W6
Yale no. 1938.2432
Dura no. F679
Length 46 mm

The surface decoration apparently depicts a fish.

55

Copper alloy buckle
Provenance: L8-3
Yale no. 1934.674d
Dura no. G118
Width 43 mm

Cast loop, with tongue of hammered strip.

56

Copper alloy buckle loop
Provenance: M7-W7
Yale no. 1938.2991
Dura no. F806
Width 42 mm

57

Copper alloy buckle
Provenance unknown
Yale no. 1934.674
Dura no. unknown
Width 32 mm
Frisch and Toll 1949, pierced bronze no. 42

In general form it corresponds to buckles from Upper Germany, e.g. Walldürn (Oldenstein 1976, no. 976).

58

Copper alloy buckle
Provenance: G3-H11
Yale no. 1938.2982
Dura no. G183
Width 48 mm

A heavy casting, perhaps for horse harness. Such a buckle, almost certainly from the girth strap, is known from the Brigetio horse burials (Barkóczi 1948, 178, pl. XXXII:8).

59

Copper alloy buckle
Provenance: surface
Yale no. 1938.2990
Dura no. F2226
Width 35 mm

Iron spindle. For similar buckles, see Vindonissa (Unz and Deschler-Erb 1997, nos 2043–57).

60

Copper alloy buckle
Provenance unknown
Yale no. 1934.450d
Dura no. unknown
Width of loop 42 mm*
* Bent outwards.

Tongue of iron strip.

61

Copper alloy buckle
Provenance unknown
Yale no. 1934.674b
Dura no. unknown
Width 28 mm

Copper-coloured spindle.

See examples from Vindonissa (Unz and Deschler-Erb 1997, no. 2046 etc.). Approximately the correct size and shape for a *lorica segmentata* buckle (M. Bishop, pers. comm.), but the form is not strictly diagnostic; no other fragments from such armour have been identified.

62

Copper alloy buckle loop
Provenance unknown
Yale no. 1938.2998
Dura no. unknown
Length 27 mm

63

Copper alloy buckle loop
Provenance: Citadel, room W2
Location unknown
Dura no. K687
Width 27 mm
Known only from a site card and photograph at Yale (photograph K375)

64

Copper alloy buckle
Provenance: G1
Yale no. 1932.1480
Dura no. E256
Length 27.5 mm
Known only from a site sketch at Yale. Yale number from site-register annotation.

65

Copper alloy buckle loop
Provenance: G2-54
Yale no. 1932.1629
Dura no. E1191 (part of)
Length 41 mm
Drawn from photograph and site sketches

A compressed buckle loop.

66

Copper alloy buckle loop
Provenance unknown
Yale no. 1938.2993
Dura no. unknown
Width 18 mm

67

Copper alloy buckle tongue
Provenance: L8-W6*
Yale no. 1934.706a
Dura no. unknown
Width 33 mm
Frisch and Toll 1949, pierced bronze no. 43
* From a sketch of this object in a site notebook.

From a buckle with a rectangular loop. A buckle with a tongue of similar form is known from Drobeta, Romania (Dawson 1989, 365, fig. 9:1; Petculescu 1995, Grave 7, 137–8, pl. 8:1).

68

Copper alloy buckle loop
Provenance: N9
National Museum, Damascus
Dura no. I901
Length 38 mm, width 43 mm, thickness 4–6 mm
Frisch and Toll 1949, pierced bronze no. 52

Tongue **67** is from a buckle like this. Similar buckle loops are known from Dacia (Drobeta and Porolissum, Romania: Dawson 1989, 365, fig. 7:1, 3). The first of these parallels is attached to a plate like **91**. These square-loop buckles do not seem to be known in Upper Germany.

69

Copper alloy buckle
Provenance: C3-D7
Yale no. 1938.2989
Dura no. F2130
Width 39 mm

Iron spindle. A buckle with a loop and tongue like this is known from Poetovio (Curk 1975, no. 3119, pl. XXVI:18).

70

Copper alloy buckle loop
Provenance unknown
Yale no. 1938.3371
Dura no. unknown
Width 41 mm

71

Iron buckle (from Halebiyeh)*
Provenance: Halebiyeh
Yale no. 1938.5999.1157
Dura no. unknown
Width 32 mm, overall length 40 mm

At a late stage in the preparation of the catalogue this piece was discovered not to be from Dura; it was excavated at Halebiyeh (Zenobia) upstream of Dura by a sub-expedition conducted during the ninth season. It was recovered from Tomb-tower III (Toll 1937, 17, no. 1; pl. 6, no. 4).

Perhaps a Partho-Sasanian form. An iron buckle of similar type, but with a more rounded loop, was excavated from a fourth-century Sasanian context at Susa (Ghirshman 1979, 183, fig. 2). A third- or fourth-century Roman buckle of rather similar form, with a fixed rectangular loop and pierced attachment lugs, is known from Drobeta, Romania (Dawson 1989, 365, fig. 9:1).

72

Copper alloy buckle loop
Provenance unknown
Yale no. 1938.2158
Dura no. unknown
Length 36 mm, width 31 mm, thickness 2.5 mm
Frisch and Toll 1949, pierced bronze no. 40

A common type of buckle loop, known from many provinces, e.g. Zugmantel and Saalburg in Upper Germany (Oldenstein 1976, nos 1013–14) and Dacia (Buciumi: Chirila *et al.* 1972, 72, pl. LXXI:34; Porolissum, Romania: Dawson 1989, 365, fig. 7:4–5). See also Viminacium (Zotovic and Jordovic 1990, 100, Grave 202, no. 5, pl. CLXVI). They are numerous in Britain, e.g. Great Chesters (Allason-Jones 1996, 194, no. 49, fig. 12), Newstead (Curle 1911, pl. LXXVI:8) and Aldborough (Bishop 1996, no. 436). An example is known from Villasequilla de Yepes, Spain (Fernández 1996, 54, fig. 1:3, photograph 2).

73

Copper alloy buckle loop
Provenance: 'N8-SW Angle'*
National Museum, Damascus
Dura no. E188
Dimensions unknown
Frisch and Toll 1949, pierced bronze no. 41
* From Yale record card. Site-register for E188 gives 'N8 near southwest tower'.

Similar to **72**.

74

Copper alloy buckle loop
Provenance: J7-2
Yale no. 1938.2085
Dura no. G1844
Width 29 mm, length 39 mm, thickness 2.5 mm

Traces of an iron tongue. Similar to **72**.

Buckle and belt plates and attachments

75

Copper alloy buckle plate (?)
Provenance: 'G1-125 (or 105)'
National Museum, Damascus
Dura no. K501
Length 98 mm, width 35 mm, thickness 0.5 mm
Known from a site card and photos at Yale (K280 and Damascus negative N142). Described as a 'thin repoussé plate chased from back and retouched from face side'.

Its general size and conformation suggest that it is probably a buckle plate, but it may possibly come from a box (L. Allason-Jones, pers. comm.). No very close parallels are known to me, but the piece is related in its decorative style to disc-shaped loop fittings such as **123**.

76

Copper alloy buckle plate
Provenance: J1
Yale no. 1932.1484
Dura no. E1371
Length 42 mm, width 34 mm
Frisch and Toll 1949, pierced bronze no. 51

Similar pierced plates, minus the buckle attachments, are known from Dacia (Risnov, Dacia: Dawson 1989, 364, fig. 2:1–2).

77

Copper alloy buckle plate
Provenance: J7
Yale no. 1938.2137
Dura no. G1865
Length 61 mm, width 22 mm, thickness 5 mm
Rep. VII–VIII 388–90, pl. XXXIX, 2: Frisch and Toll 1949, pierced bronze no. 54

A belt plate, probably part of a composite buckle with loops like **72**. The orientation of the animals show that this was worn on the (wearer's) right side of the belt fastening.

There is a perfect parallel from Lauriacum, where the casting is better defined and reveals the animals to be a dog pursuing a hare or rabbit (*RLÖ* XVII, fig. 42). Pierced rectangular plates with a similar terminal and dog-hare motif, were found at Carnuntum (*RLÖ* IX, fig. 54:10) and at Kerch in the Crimea (Treister 1994, fig. 4:7). Closely related are La Tène-inspired abstract pieces of much the same asymmetric shape, for example from Newstead (Curle 1911, 304, pl. LXXVI:2) and Zugmantel (Oldenstein 1976, no. 926). See also the discussion and further parallel material in Frisch and Toll 1949, 22.

78

Pierced copper alloy belt plate
Provenance: G3-M1
National Museum, Damascus
Dura no. K148
Length 33 mm+, width 28 mm, thickness 5 mm
Frisch and Toll 1949, pierced bronze no. 82; Matheson 1992, fig. 17

A damaged belt terminal plate, with two 'rivets' on the back of the crown-shaped projection, and an empty rivet hole.

This is part of a *FELIX VTERE* belt-set; the preserved part includes the V, and probably also incorporated the ligatured T, as seen on the effectively identical component in the Lyons burial (Wuilleumier 1950, fig. 1; Bishop and Coulston 1993, fig. 92:1). Fittings from such belts are also known from Dacia (Petculescu 1991) and Pannonia: for an example from Carnuntum, see *RLÖ* XVII, fig. 21.

79

Copper alloy buckle plate
Provenance unknown
National Museum, Damascus
Dura no. unknown
Length 62 mm, width 18 mm, thickness 2–3.7 mm
Frisch and Toll 1949, pierced bronze no. 56

The best parallel is from Sarmizegetusa (Dawson 1990, 7, no. 15, pl. 1, fig. 2). Also generally similar to a find from Schirendorf (Oldenstein 1976, no. 242).

80

Copper alloy buckle plate
Provenance unknown
National Museum, Damascus
Dura no. I301
Length 65 mm
Frisch and Toll 1949, pierced bronze no. 55

Attached via two rivet holes. *Contra* Frisch and Toll, the central motif is surely a stylized dolphin.

Paralleled at South Shields (Allason-Jones and Miket 1984, 3.773) and approximately at Pfünz (Oldenstein 1976, no. 244).

81

Copper alloy buckle or belt plate
Provenance: J8
Yale no. 1938.3473
Dura no. unknown
Length 29 mm+,width 23 mm,thickness 4 mm
Frisch and Toll 1949, pierced bronze no. 58

Probably a buckle plate. No very close parallels.

82

Copper alloy buckle or belt plate (?)
Provenance: M8-W6
Yale no. 1938.2148
Dura no. 'F683 (F139)?'*
Length 40 mm+, width 20 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 62
*According to site-register.

83

Copper alloy buckle or belt plate (?)
Provenance: E7-29
Yale no. 1932.1585
Dura no. E865
Length 71 mm+

The now-lost volute-like terminals are illustrated on a site sketch at Yale. A set of belt plates with such volutes was found at Neuburg on the Danube (Hübener 1964, 21–4, figs 4–5).

For another rough parallel to the terminals see Zugmantel (Oldenstein 1976, no. 837), and a similar feature on a piece from Cannstatt (Oldenstein 1976, no. 384). Another parallel comes from Pfünz (*ORL* B73, pl. XII:87).

84

Copper alloy buckle or belt plate
Provenance: F3-E.St.
National Museum, Damascus
Dura no. F1245
Length 72 mm
Frisch and Toll 1949, pierced bronze no. 57, fig. 9

Same provenance and Dura no. as **107**. The single *pelta* may indicate that it is from a composite buckle.

A pierced plate with hinge for a buckle was found at Hama (Ploug 1985, 221, fig. 54b). A plate with similar pierced decoration, but with non-intersecting circles, is known from Banks East turret on Hadrian's Wall (Allason-Jones 1988, 215 and 227, 52a.2). The peltate terminal is paralleled at Kösching (Oldenstein 1976, no. 780), the pierced decor is similar to examples from Pfünz and Osterburken (Oldenstein 1976, nos 790, 804). Plates with similar decoration are also known from Thamusida, Mauretania (Boube-Piccot 1994, nos 107–8). A variety of pierced plates of the general type are known from Buciumi, Romania (Chirila *et al.* 1972, 74, pl. LXXVI:1–6).

85

Copper alloy buckle or belt plate
Provenance: G2-44
Yale no. 1932.1419
Dura no. E1137
Length 61 mm, width 20 mm, thickness 3 mm
Frisch and Toll 1949, pierced bronze no. 60

The rivet hole positions suggest it was deliberately asymmetric, and may be from a composite buckle.

A recent find of a complete set of such open plates with central 'axle' was made at Lechinta de Mures, Romania. It is clear from these that such plates were used horizontally on a narrow belt (Petculescu 1995, 134–7, pl. 6). The overall shape of the piece is closely similar to an enamelled example from Zugmantel (Oldenstein 1976, no. 888). A similar plate, open in the centre, is known from Newstead (Curle 1911, 307, pl. LXXVIII:14). There is also a parallel from Chesters (site museum, no. 2239). The median 'axle' is paralleled on another plate from Buch (Oldenstein 1976, no. 832) and closer to Dura, at Hama (Ploug 1985, 215, fig. 52b).

86

Copper alloy belt plate
Provenance unknown
Yale no. 1938.2163
Dura no. unknown
Length 54 mm, width 26.5 mm, thickness 4 mm
Frisch and Toll 1949, pierced bronze no. 69

There are perfect parallels from Richborough (Bushe-Fox 1949, 148, pl. LIV:228) and Zugmantel (Oldenstein 1976, no. 929). See also a piece from Drnholec, in the Czech republic (Tejral 1994, fig. 10:19).

87

Copper alloy belt plate
Provenance: C3-D
Yale no. 1933.642b
Dura no. F2154
Length 49 mm, width 20 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 71

For parallels see Great Chesters (Allason-Jones 1996, 193, no. 40, fig. 10), and examples from Zugmantel and Saalburg (Oldenstein 1976, nos 819, 820).

88

Copper alloy belt plate
Provenance: M8-W1
National Museum, Damascus
Dura no. F738
Length 53 mm, width 21 mm
Frisch and Toll 1949, pierced bronze no. 72

Frisch and Toll describe it as identical to **87**.

89

Enamelled (?) copper alloy belt plate
Provenance unknown
Yale no. 1938.3299
Dura no. unknown
Length 82 mm, width 26 mm, thickness 4 mm
Frisch and Toll 1949, pierced bronze no. 85

Heavily corroded, probably originally enamelled. Zugmantel produced a similar enamelled plate with a peltate terminal (Oldenstein 1976, no. 887). Similar pieces are known from Viminacium (Zotovic and Jordovic 1990, 84, Grave G-58, no. 3, pl. LXXXVI).

90

Enamelled copper alloy belt plate
Provenance: E7-20
Yale no. 1932.1412
Dura no. E736
Length 86 mm, width 40.5 mm, thickness 2.5 mm
Frisch and Toll 1949, enamelled bronze no. 31

The plate was attached to leather by means of two large cast studs. It probably originally had a central longitudinal 'axle' linking the peltate ends. The enamel, or perhaps more accurately millefiore glass inlay, was discoloured and flaking when found. It consisted of 'mosaic checkerboard enamel, consisting of units of five white cubes, imbedded in the cobalt blue enamel. Each "pelta" is divided into two segments; the vertical rectangular plaques are divided into two fields by a small horizontal cavity, filled with red enamel.' (Frisch and Toll 1949, 42).

This type could be attached to a belt either upright (see Allason-Jones and Miket 1984, no. 3.10) or perhaps horizontally; examples from Saalburg and Osterburken have buckles at the narrow end (Oldenstein 1976, nos 809, 811), but M. Bishop observes (pers. comm.) that these could be for suspending something from the belt. A single plate from South Shields is especially close in form (Allason-Jones and Miket 1984, no. 3.10). See also Carnuntum (*RLÖ* VIII, 12, 97–112, fig. 5A). Analogous enamelled plates, with triangular or lunate ends, are known from Volubilis and Banasa in Mauretania (Boube-Piccot 1994, nos 56–60).

91

Copper alloy belt plate
Provenance unknown
Yale no. 1938.3466
Dura no. unknown
Length 52 mm, width 44 mm, thickness 1.5 mm

A rectangular plate with a pattern of apertures and corner rivets, one of which is broken away.

Identified as a belt plate by comparison with two pieces of closely similar size and shape, one of which has a buckle on the short side, from Dacia (Drobeta, Romania; Dawson 1989, 365, fig. 7:1–2; Petculescu 1995, 137–8, pl. 8).

92

Copper alloy belt plate
Provenance unknown
Location unknown
Length 45 mm, width 45 mm
Published in Cumont 1926, 257 n. 5, fig. 57

An object closely similar to **91**, with central and corner rivets.

93

Copper alloy belt plate
Provenance: M8-I4
Yale no. 1938.2088
Dura no. F303
Width 32 mm, thickness 2.5 mm
Frisch and Toll 1949, pierced bronze no. 39

The shape suggests a reinforcement to a square strap end. Method of attachment unclear. Similar to **34**, but rather too narrow to be from a baldric.

94

Copper alloy belt plate
Provenance: G2-40
Yale no. 1932.1420
Dura no. E1371
Length 31 mm, width 19 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 35

The shape suggests a reinforcement to a square strap end. One central rivet.

Quite similar to a plate from Wroxeter (Bishop 1991, 26, fig. 5.2:B, no. 3).

95

Copper alloy belt plate
Provenance: J1
Yale no. 1938.2164
Dura no. unknown
Length 30 mm, width 29 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 34

Attached by means of two rear studs on the axis of symmetry. No very close parallels.

96

Copper alloy belt plate
Provenance unknown
Yale no. 1938.2165
Dura no. unknown
Length 32 mm, width 30 mm, thickness 1.5 mm
Frisch and Toll 1949, pierced bronze no. 33

Closely similar pieces are known from Dacia (Buciumi: Chirila *et al.* 1972, 75, pl. LXXVI:7–8; Risnov, Romania: Dawson 1989, 364, fig. 2:3).

97

Bone belt plate (?)
Provenance: 'Necr.[opolis] Trench II'
Yale no. 1934.521
Dura no. G2118
Width 38 mm
Russell 1976, 43, no. 2

Polished bone.

The provenance probably means that this piece was found in the great mound of refuse of Roman date overlying part of the necropolis (*Rep.* IX.ii, 3–4). No close parallels, but it is similar to **96**.

98

Bone belt plate (?)
Provenance: 'Necr. [opolis] Trench III'
Yale no. 1938.731
Dura no. I755
Width 38 mm
Russell 1976, 43, no. 1

Polished bone, with copper alloy rivet *in situ*.

The provenance probably means that this piece was found in the great mound of refuse of Roman date overlying part of the necropolis (*Rep.* IX.ii, 3–4).

99

Copper alloy belt mount
Provenance: L8-B2*
Yale no. 1934.705a
Dura no. unknown
Length 38 mm, width 24 mm
Frisch and Toll 1949, pierced bronze no. 28
*From a site notebook containing an outline tracing almost certainly of this object.

A belt-set from a cremation grave at Klosterneuburg near Vindobona, dated *c.* AD 200, includes three fittings of exactly this form. One has the additional crown-shaped component (as on **77** and **78**) which shows the form was used on a belt, and incidentally shows that the axis was orientated horizontally (Historischen Museums der Stadt Wien 1975, cat. no. A15a, pl. 25; Neugebauer and Grünewald

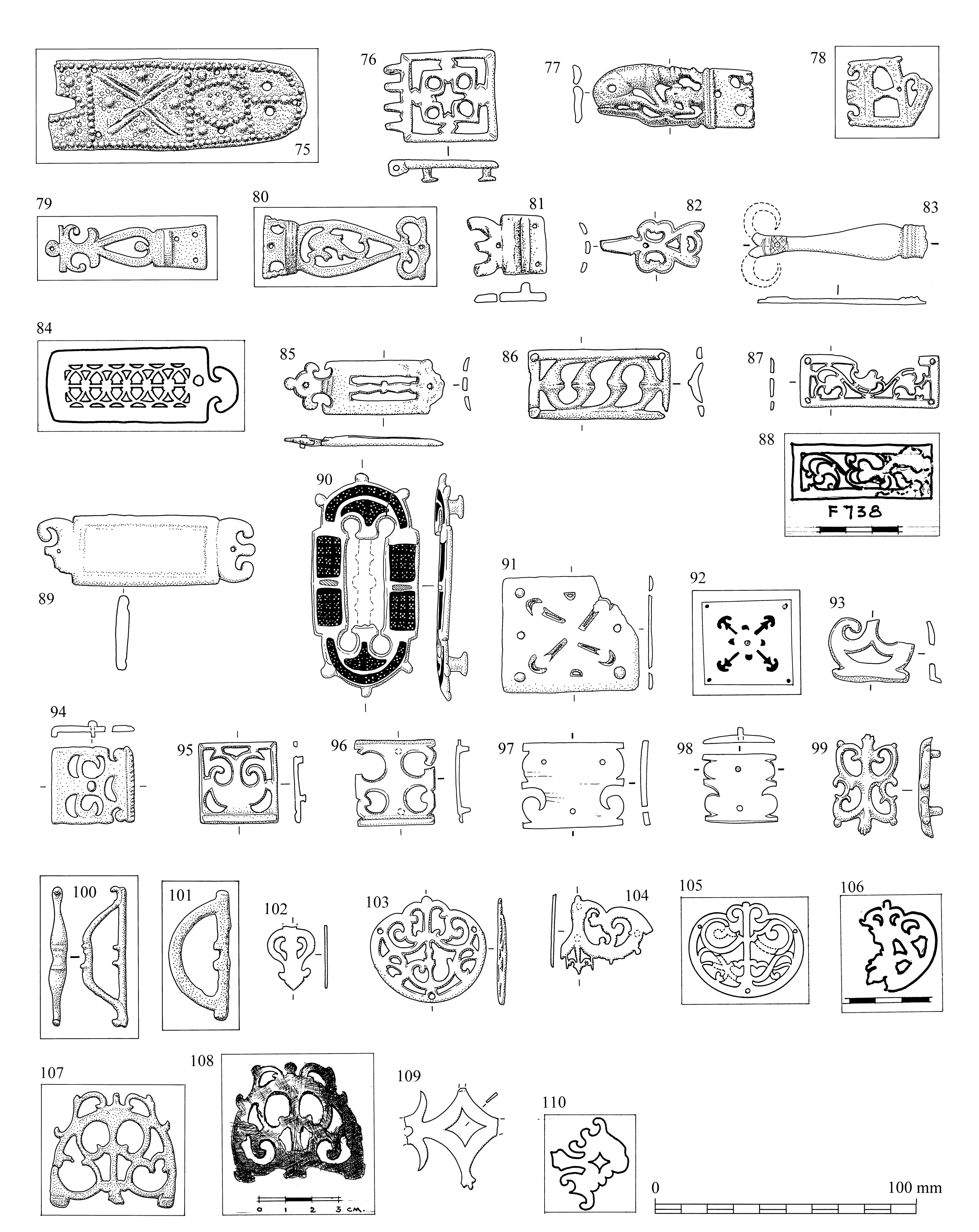


Figure 38 Buckle and belt plates, **75** to **110**. Copper alloy.

1975). Almost identical examples are also known from Zugmantel (Oldenstein 1976, nos 934–5). A similar piece is known from Dacia, at Sarmizegetusa (Dawson 1990, 7, no. 16, pl. 1, fig. 2).

100
Copper alloy bow-shaped fitting
Provenance: 'T of A stairs'*
National Museum, Damascus
Dura no. I844
Length 52 mm, thickness up to 6 mm
Recorded in site drawings and photographs at Yale (Damascus negative N142)
* The following has been added to the card; '[Tower of the] Archers? [Temple of] Atargatis? Artemis?'.

An accurate representation of a composite reflex bow. The lugs on the 'string' are to confine the loop by which the object was linked to the backing plate; it was fairly free to swing around its centre.

A near-perfect parallel is attached to a pierced plate from Pfünz (Oldenstein 1976, no. 951). See also another isolated bow from Zugmantel (Oldenstein 1976, no. 952).

101
Copper alloy bow-shaped fitting
Provenance: G3-F2
National Museum, Damascus
Dura no. E775
Length 48 mm, thickness 3 mm

A piece similar in form to, but cruder in execution than, **100**.

102
Pierced copper alloy plate
Provenance: M8-W6
Yale no. 1938.2320
Dura no. G1809
Length 24 mm, width 18 mm, thickness 1 mm
Frisch and Toll 1949, pierced bronze no. 77

From its thinness, it is perhaps from soldier's rather than equestrian harness. The motif is much like that on **111**.

103
Pierced copper alloy plate
Provenance: D-Wall St
Yale no. 1938.2097
Dura no. K668
Width 43.5 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 65

Strap-mounts of similar size and pattern are known from Dacia (Buciumi: Chirila *et al.* 1972, 74, pl. LXXIII:4; Porolissum, and Praetorium I: Dawson 1989, 364, figs 2:17, 5:8).

104
Pierced copper alloy plate
Provenance unknown
Yale no. 1938.2145
Dura no. unknown
Width 35 mm+, height 30 mm+, thickness 1 mm
Frisch and Toll 1949, pierced bronze no. 76

Part of a plate like **103**. Possible rivet scars on the back. There is a near-perfect parallel from Weissenburg (Oldenstein 1976, no. 643).

105
Pierced copper alloy plate
Provenance: G2-11
National Museum, Damascus
Dura no. E820
Dimensions not recorded
Frisch and Toll 1949, pierced bronze no. 66

Almost identical to **103**.

106
Pierced copper alloy plate
Provenance: Tower 20
Yale no. 1938.2144
Dura no. F1813
Height 34 mm
Known from a crude sketch on a card and a photograph at Yale (photograph 748)

Almost identical to **103**.

107
Pierced copper alloy plate
Provenance: F3-St.E
National Museum, Damascus
Dura no. F1245
Length 44 mm, width 49 mm, thickness 2.5 mm
Frisch and Toll 1949, pierced bronze no. 64

Same provenance and Dura no. as **84**.

'The ornament has three studs. One is at the back of the fusing point of palmette and "pelta", the two others are at each of the protruding sides of the palmette's lower or outer side' (Frisch and Toll 1949, 25).

108
Pierced copper alloy plate
Provenance: B2-C2
Location unknown
Dura no. F139
Length *c.*46 mm,width *c.*51 mm
Known only from a site card at Yale

This piece is identical in shape to **107**, but apparently more complete. It could be a duplication of **107**, but the provenance details are different.

109
Pierced copper alloy plate
Provenance: G5-NW
Yale no. 1938.2099
Dura no. K5
Length 36 mm+,width 38 mm+, thickness 1 mm
Frisch and Toll 1949, pierced bronze no. 78

110
Pierced copper alloy plate
Provenance: L7-W38
National Museum, Damascus
Dura no. F978
Dimensions unknown
Frisch and Toll 1949, pierced bronze no. 79

Attachment loops and rings

111
Copper alloy attachment loop
Provenance unknown
Yale no. 1938.2146
Dura no. unknown
Length 48 mm
Frisch and Toll 1949, pierced bronze no. 61

Possibly an attachment loop from a belt (functioning like **113** etc.) or alternatively from horse harness (compare **356**). A piece similar in form, but lacking the axial ivy-leaf motif, is known from Volubilis (Boube-Piccot 1994, no. 100).

112
Copper alloy attachment loop (?)
Provenance unknown
Yale no. 1938.3323
Dura no. unknown
Length 26 mm+, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 63

113
Copper alloy ring attachment
Provenance: G3-NE
National Museum, Damascus
Dura no. K12
Length 52 mm, width 24 mm

An articulated suspension ring, probably from a waist-belt. Such loops, perhaps for attaching a purse, are widely found in fourth-century belt-sets.

Three such fittings, two still with their rings, were found at Richborough (Bushe-Fox 1949, 123, 145, nos 70, 187–8, pls XXXII, LII:187). See also Dorchester on Thames (Bullinger 1969, 95, pl. LVIII), Belleray, France (Bullinger 1969, 94, pl. XI:5–6), Mainz-Kostheim, Germany (Bullinger 1969, 94, pl. XXXIII), Graben 829 and 846, Rhenen, Holland (Bullinger 1969, 98, pls LIX, C). The last apparently has two such loops on the lower edge of the belt to the (wearer's) left of the buckle.

114
Silver ring attachment
Provenance unknown
Yale no. 1938.3205
Dura no. unknown
Dimensions not recorded.

115
Copper alloy ring attachment
Provenance: G1-36
Yale no. 1932.1468
Dura no. E559
Length 22 mm+ (originally *c.*46 mm including ring)

A drawing from a site card at Yale reproduced here shows it had a ring attached when found.

116
Copper alloy ring attachment
Provenance: J7-W2
Yale no. 1938.3199
Dura no. G1674
Length 41 mm+, width 21 mm

Contains a copper alloy rivet. Cut from plate.

117
Copper alloy ring attachment
Provenance unknown
Yale no. 1938.3212
Dura no. unknown
Length 33 mm+

118
Copper alloy ring attachment
Provenance: K8-W2*
Yale no. 1938.3203
Dura no. unknown
Length 48 mm+
* From a tracing, definitely of this object, in a site notebook.

119
Copper alloy ring attachment
Provenance: G1-59
Yale no. 1938.3201
Dura no. E1181
Length 54 mm+

Site-register gives 'E1181 . . . bronze spoon bowl', which is a possible misunderstanding of this object. It is annotated '1932.1598', perhaps an earlier number assigned to this item.

Traces of a rivet hole at the break. Unfinished?

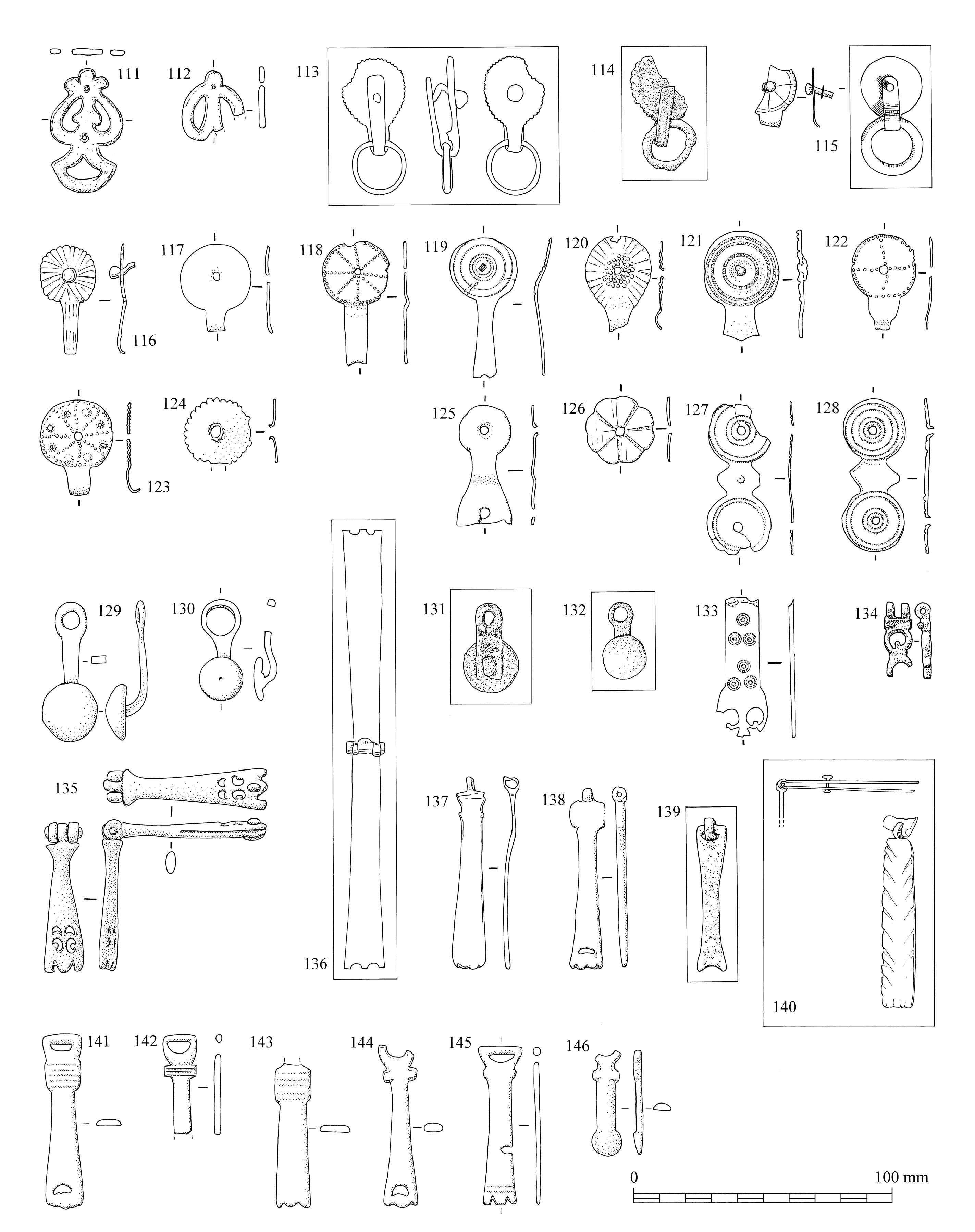


Figure 39 Suspension loops and rings **111** to **124**, related fittings **125** to **128**, button-and-loop fasteners **129** to **132**, strap terminals and pendants **133** to **146**. Copper alloy, except **114** (silver?).

120
Copper alloy ring attachment
Provenance unknown
Yale no. 1938.3207
Dura no. unknown
Length 37 mm+

121
Copper alloy ring attachment
Provenance unknown
Yale no. 1938.3204
Dura no. unknown
Length 42 mm+

The centre of the disc contains remains of an iron rivet.

122
Copper alloy ring attachment
Provenance: M7-W11
Yale no. 1938.3209
Dura no. F1008
Length 37 mm+

123
Copper alloy ring attachment
Provenance unknown
Yale no. 1934.706c
Dura no. unknown
Length 37 mm+

The decoration resembles that on 75.

124
Copper alloy ring attachment
Provenance unknown
Yale no. 1938.3406
Dura no. unknown
Length 25 mm+

125
Copper alloy ring attachment (?)
Provenance unknown
Yale no. 1938.3200
Dura no. unknown
Length 46 mm+

Apparently bent straight.

126
Copper alloy mount
Provenance: C3-A
Yale no. 1938.3206
Dura no. F2100
Diameter 27mm

The surface bears file-marks. Studs of similar shape are known from Hadrian's Wall (Allason-Jones 1988, 213, 226, 50b.4) and Zugmantel (Oldenstein 1976, no. 704).

127
Copper alloy double disc mount
Provenance unknown
Yale no. 1938.3198
Dura no. unknown
Length 58 mm+

These mounts bear at least a passing resemblance to Antonine harness fittings (Bishop and Coulston 1993, fig. 81). Apart from the Dura finds, they appear to be a Balkan regional type. There is an identical piece from Poetovio (Curk 1975, no. 2176, pl. XXXI:19), and a reasonable parallel from Ocnita, Romania (Petculescu 1994, pl. 3:6). See also Intercisa (Barkóczi *et al.* 1954, pl. XX:9). Lead castings of the same shape were found at Siscia (Koscevic and Makjanic 1995, 21, nos 519–21, pl. 48).

128
Copper alloy double disc mount
Provenance: E7-W
Yale no. 1932.1599
Dura no. E1209
Length 59 mm

Button-and-loop fasteners

129
Copper alloy button-and-loop fastener
Provenance: G1-36
Yale no. 1932.1601
Dura no. E521
Length 53 mm

A type of object known in a range of variants among the 165 examples catalogued by Wild (1970). Wild lists many examples from Britain and the Rhine and a few from the Danube and Italy, but opines that a search would probably reveal many more in other provinces (Wild 1970, 137), a view vindicated here. The purpose of these objects is obscure, but the elaborate decoration of some suggests that they were meant to be seen. Their traditional identification as clothing fasteners is less plausible than their use on equestrian equipment or even for attaching bladed weapons to belts. It is likely that they served a variety of functions (Wild 1970, 145–6).

None of the Dura examples correspond exactly to Wild's typology; they are closest to his Type VIIIa. Good parallels are known from Aldborough (Bishop 1996, no. 369) and Vindonissa (Unz and Deschler-Erb 1997, nos 2066–84). See also Augst (Deschler-Erb *et al.* 1991, 76, no. 96).

130
Copper alloy button-and-loop fastener
Provenance: L7-W23
Yale no. 1938.3054
Dura no. F1288
Length 39 mm

A yellow alloy.

131
Copper alloy button-and-loop fastener
Provenance unknown
Yale no. 1938.3211
Dura no. unknown
Length 35 mm

132
Copper alloy button-and-loop fastener
Provenance: L7-W9
Yale no. 1938.3210
Dura no. F446
Length 30.5 mm

A yellow alloy.

Strap terminals

133
Copper alloy strap terminal
Provenance: L7-W2
Yale no. 1938.2429
Dura no. G2001
Length 54 mm+

There is a good parallel from Niederbieber (Oldenstein 1976, no. 894). However, a remarkable concentration of very similar pieces comes from Volubilis and Banasa in Mauretania (Boube-Piccot 1994, nos 146–61). It may be a Mauretanian regional type.

134
Hinged copper alloy strap terminal
Provenance unknown
Yale no. 1938.2151
Dura no. unknown
Length 28 mm+, width 10 mm
Frisch and Toll 1949, pierced bronze no. 50

It resembles pieces from Niederbieber and Zugmantel (Oldenstein 1976, nos 390–1) in general size and decorative form, although the hinge attachment is different. Similar to items from Colchester (Crummy 1983, 136, fig. 175, no. 4236) and Wickford (Bishop 1991, 27, fig. 5.3:C, no. 2). A piece from South Shields may be the other half of such a hinged fitting (Allason-Jones and Miket 1984, 3.790).

135
Copper alloy hinged strap terminal
Provenance: G5-NW
Yale no. 1938.2458
Dura no. K15
Length of attachment 63 mm, of pendant 5 mm, original overall length *c.*112 mm. Thickness 4 mm.

A heavy terminal, two cast components hinged together.

For similar heavy, two-part symmetrical strap ends see Fischer 1988, including an unprovenanced silver pair probably from Bulgaria or European Turkey (167, nos 4–5, fig. 1) and useful parallels to the present piece from Carnuntum (180, fig. 7:3), Eining (185, fig. 10:2) and others. Reasonably close parallels are also to be found at Osterburken, and Zugmantel (Oldenstein 1976, nos 325, 328–9). An object inscribed VTERE FELIX from South Shields is probably from a heavy, hinged decorative terminal of this general type (Allason-Jones and Miket 1984, 3.726). The upper half of a generally similar, but plain, hinged terminal was found at Stonea Grange (Jackson and Potter 1996, 356, no. 122, fig. 115).

136
Hinged copper alloy strap terminal
Provenance: G1-12
Location unknown
Dura no. E370
Length 166.5 mm
Known only from a site card at Yale

A pair of silver terminals of similar shape, unprovenanced but probably from Bulgaria or European Turkey, are now in Munich (Fischer 1988, 167, nos 4–5, fig. 1). Similar in overall form to pieces from Osterburken and Zugmantel (Oldenstein 1976, nos 325, 334).

137
Hinged copper alloy strap terminal
Provenance unknown
Yale no. 1938.2558
Dura no. unknown
Length 73 mm

Probably a stylized sword. Generally similar to a piece from Zugmantel (Oldenstein 1976, no. 328).

138
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.5999.1161
Dura no. unknown
Length 69 mm

Heavily corroded.

Roughly paralleled at Zugmantel (Oldenstein 1976, no. 328).

139
Hinged copper alloy strap terminal
Provenance: G3-55
National Museum, Damascus
Dura no. K59 (part of)
Length 60 mm (excluding ring)
Known from a photograph at Yale (Damascus negative N125) and sketched on a site card

Apparently found with **140**, **361** and **362**. Similar to a find from Osterburken (Oldenstein 1976, no. 332).

140
Hinged copper alloy strap terminal
Provenance: G3-55
National Museum, Damascus
Dura no. K59 (part of)
Length of components 70 mm and 60 mm*
Known from a site sketch and a photograph at Yale (Damascus negative N125)
*The record does not specify which is which.

Apparently found with **139**, **361** and **362**. A pendant suspended by a loop round an axle held to the end of a strap by a folded and riveted plate. Apparently both components were badly corroded but largely intact when discovered.

No very close parallels.

141
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2422
Dura no. unknown
Length 67 mm

Probably a stylized sword.

Similar to pieces from Zugmantel and Osterburken (Oldenstein 1976, nos 331–2). Loosely similar to sword-shaped pendants like those from Zugmantel (Oldenstein 1976, 354–6) and elsewhere in Upper Germany.

142
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2425
Dura no. unknown
Length 38 mm+

Loosely similar to pieces from Zugmantel and Osterburken (Oldenstein 1976, nos 331–2).

143
Copper alloy strap terminal
Provenance: G2-28
Yale no. 1932.1490 (part of)*
Dura no. E992
Length 55 mm+
* Site-register gives ‘E992a-c . . . G2-28 . . . Bronze needle, button, and hinge’ and is annotated ‘1932.1490’. The ‘button’ appears to be stud **299**.

144
Copper alloy strap terminal
Provenance: C3
Yale no. 1938.2431
Dura no. F2119
Length 63 mm+

Probably sword-shaped.

145
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2419
Dura no. unknown
Length 61 mm

Probably sword-shaped.

146
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.3068
Dura no. unknown
Length 41 mm+

Probably sword-shaped. A type apparently depicting the *Ringknaufschwert*, known from Upper Germany, e.g. Zugmantel (Oldenstein 1976, nos 354–7). A similar example comes from Thamusida, Mauretania (Boube-Piccot 1994, no. 217).

147
Copper alloy strap terminal
Provenance: M7-H3
Yale no. 1938.2462
Dura no. F1274
Length 81 mm

Directly riveted to strap.

A common type. Parallels are known from Britain (e.g., South Shields: Miket 1983, 109, fig. 68:7; Allason-Jones and Miket 1984, 3.593–5; Chesters, site museum nos 1550–1) to Upper Germany (Pfünz: Oldenstein 1976, no. 340) and Dacia (Inlaceni, Romania: Dawson 1989, 364, fig. 2:4–5).

148
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2473
Dura no. unknown
Length 57 mm

149
Copper alloy strap terminal
Provenance: G3-G10?*
Yale no. 1938.2474
Dura no. G76?*
Length 58 mm
* Appears to be identical with an item drawn on a site card bearing these details.

150
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2557
Dura no. unknown
Length 60 mm

151
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.3185
Dura no. unknown
Length 40 mm+

A split fixing, with rivet in place, for attachment to the end of a leather strap. Traces of possible tinning or silvering. Probably a variant of **147**.

A pierced terminal with similar projections on the shoulders of the ring is known from Sarmizegetusa (Dawson 1990, 7, no. 17, pl. 1, fig. 2).

152
Copper alloy strap terminal
Provenance: E7-W
Yale no. 1932.1593
Dura no. E1147
Length 57 mm

A parallel, complete with a riveted strip through the aperture for attaching to a leather strap, is known from Hadrian’s Wall (Allason-Jones 1988, 216, 228, 52a.9), and another from Vindonissa (Unz and Deschler-Erb 1997, no. 1300). There are similar examples from Dacia (Buciumi: Chirila *et al.* 1972, 72, pl. LXXI, nos 2–3, 10, 18, 20; Aruleta and Copaceni, Romania: Dawson 1989, 364, fig. 4:3–4; Sarmizegetusa: Dawson 1990, 7, nos 22–4, pl. 1, fig. 2). See one from Carnuntum (*RLÖ* XXXI, pl. 17, no. 19). The type is also known in Upper Germany (Zugmantel, Straubing: Oldenstein 1976, nos 291, 295).This form may have had a variety of uses; an example was used on a bridle excavated at Baláca, Hungary (Palágyi 1997, figs 6.74–5).

153
Copper alloy strap terminal
Provenance: E7-W
Yale no. 1932.1594
Dura no. E1311
Length of attachment 55 mm, pendant *c.*52 mm
Known only from a record card at Yale

Very like **152** but still with its attachment when found.

154
Copper alloy strap terminal
Provenance: G1-14
Yale no. 1934.701f
Dura no. E337a
Length 45 mm

155
Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2417
Dura no. unknown
Length 45 mm+

Bears knife-cut decoration.

A similar example, complete with a riveted strip through the aperture for attachment to a leather strap, is known from Dacia (Drobeta, Romania: Dawson 1989, 364, fig. 2:6).

156
Copper alloy strap terminal
Provenance unknown
Yale no. 1934.701g
Dura no. unknown
Length 39 mm+

There is a similar piece from Newstead (Curle 1911, 301, no. 15, pl. LXXVI). See also Zugmantel (*ORL* B8, pl. X:67).

157
Copper alloy strap terminal
Provenance: G3-63
Yale no. 1938.3100
Dura no. K69
Length 38 mm+

158
Silver (?) strap terminal
Provenance: E7-W9
Location unknown
Dura no. E1103
Length 49 mm

Known from a site sketch at Yale, which describes it as a ‘pendant (silver alloy?)’. Perhaps it was tinned.

It shares a provenance with a large group of ivy-leaf pendants (see **211** etc.) and a strap mount (**316**). This type is known to have been used on horse harness (see **152**).

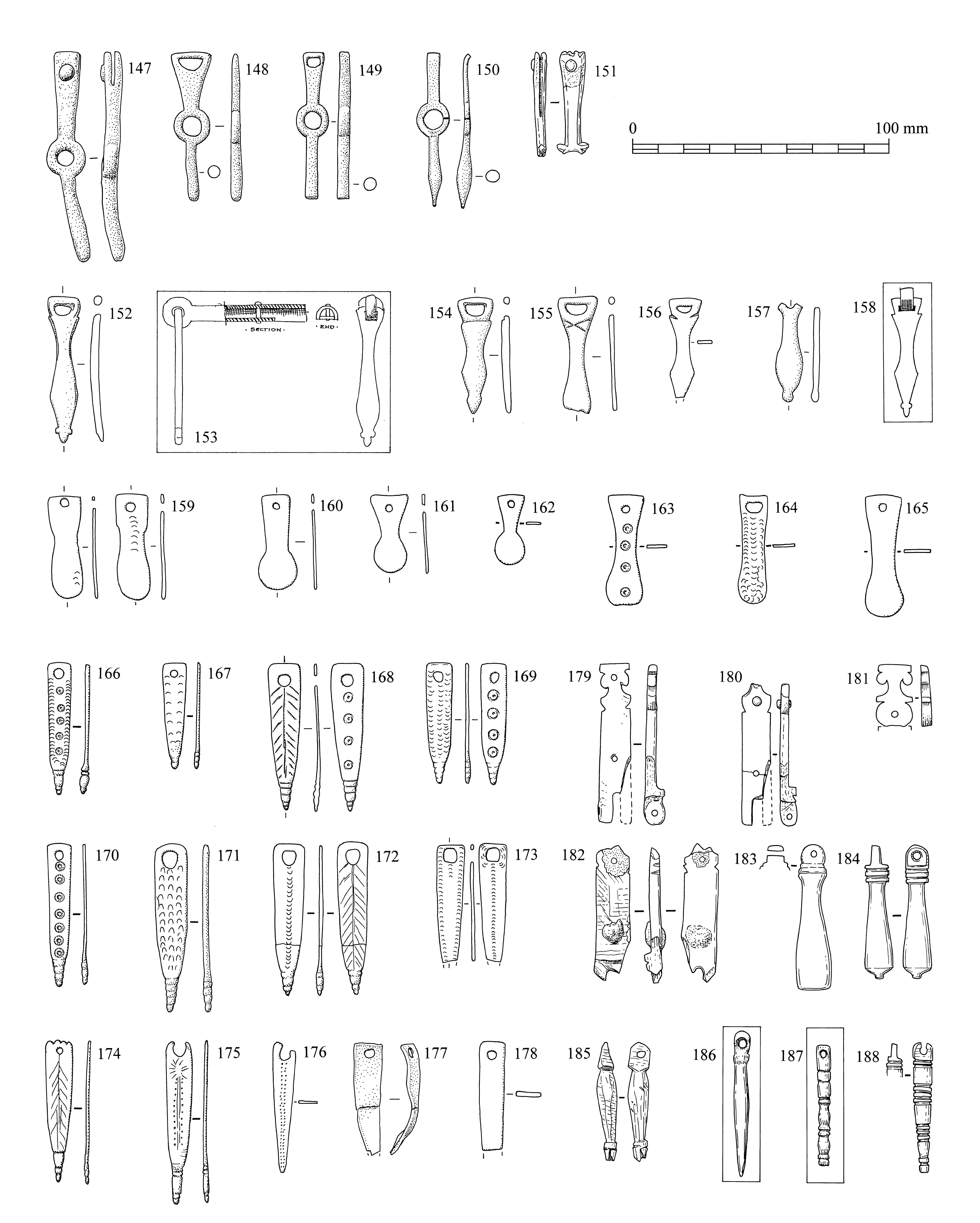


Figure 40 Strap terminals and pendants **147** to **188**. Copper alloy, except **158** (silver?), and **179** to **188** (bone or ivory).

159

Pair of copper alloy strap terminals
Provenance: G3-NE
Yale no. 1938.2470
Dura no. K17
Length 39 mm and 40 mm

A pair of strap ends, which according to a site card preserved at Yale were apparently found with ring attachment **113**.

160

Copper alloy strap terminal
Provenance: G1-20
Yale no. 1938.2428
Dura no. K285
Length 36 mm

161

Copper alloy strap terminal
Provenance unknown
Yale no. 1938.3324
Dura no. unknown
Length 30 mm

162

Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2421
Dura no. unknown
Length 27 mm

163

Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2420
Dura no. unknown
Length 43 mm

164

Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2416
Dura no. unknown
Length 42 mm

Decorated similarly on both sides.

165

Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2426
Dura no. unknown
Length 47 mm

166

Copper alloy strap terminal
Provenance: 'Sts [streets?] Roman Quarter'*
Yale no. 1938.2427
Dura no. 'D24'?*
Length 51 mm
* Apparently to be identified with an object depicted in a site sketch preserved at Yale, which bears these details.

A simple casting, embellished with ring-and-dot motifs and arcs created by angling the round punch.

This type, represented by a number of examples at Dura, seems to be of the same general form and weight as a number of other items generally accepted as strap ends from military belts. The attachment, for example, is like **159**, the form not unlike **188**. However, in detailed form, it is so far unparalleled elsewhere. It is either a regional type or perhaps a local civilian fashion.

167

Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2424
Dura no. unknown
Length 41 mm

168

Copper alloy strap terminal
Provenance unknown
Yale no. 1934.701d
Dura no. unknown
Length 56 mm

Ring-and-dot decoration on one side, and an engraved leaf pattern on the other.

169

Copper alloy strap terminal
Provenance unknown
Yale no. 1934.701e
Dura no. unknown
Length 47 mm

170

Copper alloy strap terminal
Provenance: 'Necropolis trench II' (?)
Yale no. 1938.2472
Dura no. I381 (?)*
Length 55 mm
*This number does not match the site-register, which records I381 as coins. The provenance, which probably refers to the Roman refuse heap overlying part of the necropolis (*Rep.* IX.ii, 3–4), is therefore suspect.

171

Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2423
Dura no. unknown
Length 65 mm

172

Copper alloy strap terminal
Provenance unknown
Yale no. 1934.701b
Dura no. unknown
Length 58 mm

173

Copper alloy strap terminal
Provenance: G1-46
Yale no. 1932.1578
Dura no. E1008
Length 46 mm+

174

Copper alloy strap terminal
Provenance unknown
Yale no. 1938.2418
Dura no. unknown
Length 55 mm

Crude leaf-vein pattern on both faces.

175

Copper alloy strap terminal
Provenance unknown
Yale no. 1934.701a
Dura no. G2105
Length 62 mm+

Decorated similarly on both sides.

176

Copper alloy strap terminal
Provenance unknown
Yale no. 1934.701c
Dura no. unknown
Length 51 mm

Decorated similarly on both sides.

177

Copper alloy strap terminal
Provenance: surface find
Yale no. 1932.1542
Dura no. E639
Length 43 mm+

178

Copper alloy strap terminal
Provenance: G3-62
Yale no. 1932.2471
Dura no. K65
Length 42 mm+

179

Bone strap terminal hinge plate
Provenance unknown
Yale no. 1938.1013
Dura no. unknown
Length 62 mm
Russell 1976, 45, no. 15

Identical to a piece from Mainz (Mikler 1997, no. 55/12).

180

Bone strap terminal hinge plate
Provenance: E4
Yale no. 1933.412
Dura no. F488
Length 55 mm+
Russell 1976, 45, no. 14

Similar to **179** but the terminal is lost. A copper alloy rivet is still in place.

181

Bone strap terminal hinge plate
Provenance unknown
Yale no. 1938.735
Dura no. unknown
Length 24 mm+

The broken end of a plate like **179**.

182

Bone strap terminal hinge plate
Provenance unknown
Yale no. 1938.1014
Dura no. unknown
Length 51 mm+
Russell 1976, 45, no. 16

A plate like **179**, broken at both ends, retaining remains of one iron rivet, and the staining left by another.

183

Hinged ivory strap terminal
Provenance unknown
Yale no. 1938.728
Dura no. unknown
Length 55 mm
Russell 1976, 47, no. 4
NB The drawing is a reconstruction.

Heavily split into laminations, suggesting ivory. It was probably attached by a plate similar to **179** etc.

Bulbous hinged terminals of similar form but in copper alloy are known from South Shields (Allason-Jones and Miket 1984, 3.604–5).

184

Bone strap terminal
Provenance unknown
Yale no. 1938.727
Dura no. unknown
Length 52 mm
Russell 1976, 47, no. 3

Probably attached by a plate similar to **179** etc.

185

Bone strap terminal
Provenance unknown
Yale no. 1938.729
Dura no. unknown
Length 46 mm
Russell 1976, 47, no. 6

Crudely carved, perhaps a 'field repair' replacing a lost terminal.

186

Bone strap terminal
Provenance unknown
Yale no. 1938.729a
Dura no. unknown
Length 57 mm
Russell 1976, 47, no. 7

187
Bone strap terminal
Provenance unknown
Yale no. 1934.516m
Dura no. unknown
Length 47 mm
Russell 1976, 46, no. 1

Similar to a metal version from Saalburg (Oldenstein 1976, no. 316). The belt-set from Lyons also has a pair of almost tubular pendants, about this size (Wuilleumier 1950, fig. 1; Bishop and Coulston 1993, fig. 92:2a–b).

188
Bone strap terminal
Provenance unknown
Yale no. 1934.516l
Dura no. unknown
Length 51 mm
Russell 1976, 47, no. 2

Pendants

189
Copper alloy pendant with Silenus head
Provenance unknown
Yale no. 1938.2204
Dura no. unknown
Length *c.*52 mm

Similar in general conformation to 'acorn' pendants from Germany (e.g. Aalen and Pfünz: Oldenstein 1976, nos 414–15). See also an anthropoid pendant from Zugmantel (Oldenstein 1976, no. 422). A strap junction with a face from Richborough provides a further rough parallel (Bushe-Fox 1926, 47, pl. XV:29).

190
Copper alloy harness pendant
Provenance: Street H
Yale no. 1932.1633
Dura no. E1095
Length 53 mm, width 43 mm
Frisch and Toll 1949, pierced bronze no. 88

Apparently found with a stud, **296**.

A horse harness pendant of early type (Bishop 1988, type 1, similar to variants 1n-1t, figs 43–4).

191
Copper alloy harness pendant
Provenance: Temple of Atargatis
National Museum, Damascus
Dura no. K560
Width 56 mm, thickness 3 mm
Frisch and Toll 1949, pierced bronze no. 92

A broken horse harness pendant of early imperial type (Bishop 1988, 145, figs 3:a, 44). A similar example was found at Newstead (Curle 1911, 308, pl. LXXXI:3). A piece from Zugmantel has a similar shape (Oldenstein 1976, no. 1164).

192
Enamelled copper alloy lunate pendant
Provenance unknown
Yale no. 1938.2103
Dura no. unknown
Length 35 mm
Frisch and Toll 1949, enamelled bronze no. 33

The inlay is multi-coloured. 'In the middle cavity yellow enamel with white dot; in the horns alternating pieces of red and light blue half-translucent glass; in the red segments are imbedded white dots' (Frisch and Toll 1949, 42).

This is quite a common type, sometimes found still attached to an enamelled fastening stud. Similar enamelled pendants were found at Carnuntum (*RLÖ* II, pl. X, fig. 17; *RLÖ* XXXI, pl. 21:5) and Wiesbaden (Oldenstein 1976, no. 449). See also an example from Pfünz (*ORL* B73, pl. XII:55) and two pieces from Holland (Zadoks-Josephus Jitta and Witteween 1977, no. 39 from Nijmegen and no. 48, unprovenanced).

193
Copper alloy lunate pendant
Provenance: M7-W11
Yale no. 1938.2571
Dura no. F907
Length 67 mm+, width 46 mm+

194
Copper alloy lunate pendant
Provenance unknown
Yale no. 1938.2161
Dura no. unknown
Length 60 mm+, width 51 mm+

A similar pendant was found at Vechten (Zadoks-Josephus Jitta and Witteween 1977, no. 4). Another was discovered among bridle fittings from Beuningen (Zwart 1998, no. 18).

195
Copper alloy lunate pendant
Provenance: G5-23
Yale no. 1934.706 (part of)
Dura no. G1550
Height 49 mm
Known from a card at Yale, bearing a sketch and photograph.

196
Copper alloy lunate pendant
Provenance unknown
Yale no. 1938.3304
Dura no. unknown
Length 62 mm+, width 39 mm+

Made from thin plate.

197
Copper alloy lunate pendant
Provenance unknown
Yale no. 1938.2157
Dura no. unknown
Length 39 mm+, width 32 mm

The characteristic outline and bulbous terminals are paralleled at Vechten (Zadoks-Josephus Jitta and Witteween 1977, no. 32).

198
Copper alloy lunate pendant (?)
Provenance: L8-W10*
Yale no. 1938.5999.1163
Dura no. unknown
Height 52 mm, width 55 mm
* From a site notebook sketch.

Knife-cuts around edge like the shield boss **590**. No signs of mode of attachment.

Manufacture from flat plate and knife-cut serrations around the edge are seen on a peltate mount from Zugmantel (Oldenstein 1976, no. 645).

199
Copper alloy leaf-shaped pendant
Provenance: G6-A16*
Yale no. 1932.1652*
Dura no. E1336
Length 90 mm, width *c.*60 mm
Known only from a site drawing preserved at Yale. Ring attachment.
* Details from annotations in the site-register. Current location unknown.

A generally similar piece was found at Wiesbaden (Oldenstein 1976, no. 197). Another from Straubing has the same shoulder outline (Oldenstein 1976, no. 191).

200
Copper alloy leaf-shaped pendant
Provenance: G5-A2*
National Museum, Damascus
Yale number G1229 (?)
Length 195 mm (total), 95 mm (pendant), width 73 mm, thickness 1–4 mm (bar 3 mm)
* Detail from a site card preserved at Yale which almost certainly refers to, and depicts, this item.

A ring-topped pendant still attached to a copper alloy bar of unknown function. See a similar piece from Vindonissa (Unz and Deschler-Erb 1997, nos 1304–6).

201
Copper alloy leaf-shaped pendant
Provenance: E7-W9
Yale no. 1932.1532b
Dura no. E1085 (part of)
Length 65 mm, width 42 mm+

202
Copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2119
Dura no. unknown
Length 46 mm+, width 31 mm+

Heavily curved, with pronounced wear at the top of the suspension loop.

203
Copper alloy leaf-shaped pendant
Provenance: block G3-66
Yale no. 1938.2172.2
Dura no. K194
Length 40 mm, width 26 mm
Appears in Matheson 1992, fig. 17, among objects described as coming from Block G.

A pendant with this shape was found at Niederbieber (Oldenstein 1976, no. 198).

204
Copper alloy leaf-shaped pendant
Provenance: G1-64
National Museum, Damascus
Dura no. E1203
Length 32 mm, width 16 mm, thickness 2–4 mm
From a sketch at Yale and a photograph (Damascus negative N119)

Heavily oxidized.

205
Copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2172.3
Dura no. unknown
Length 71 mm

A pendant with a similar twisted attachment loop is known from Vindonissa (Unz and Deschler-Erb 1997, no. 1514).

206
Copper alloy leaf-shaped pendant with ring attachment
Provenance unknown
National Museum, Damascus
Dura no. unknown
Length (without chain) 63 mm, width 37.5 mm, thickness 1.5 mm (tip 6.5 mm)
From a photograph at Yale (Damascus negative N138).

Still with two suspension links attached.

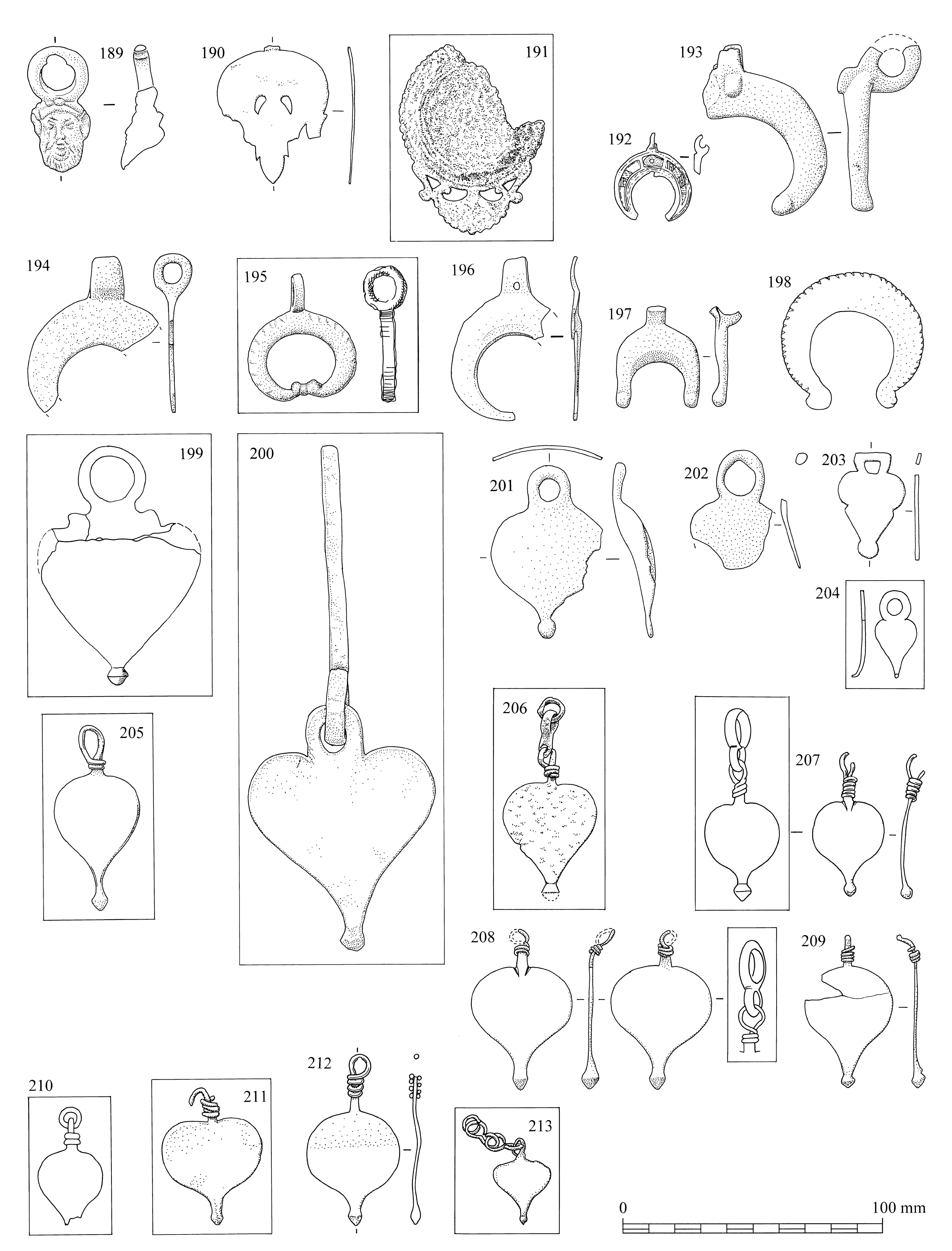


Figure 41 Pendants, probably mostly from horse harness, **189** to **213**.

A similar broad ivy-leaf pendant is known from Vindonissa (Unz and Deschler-Erb 1997, no. 1519).

207
Copper alloy leaf-shaped pendant with ring attachment
Provenance: E7-W9
Yale no. 1932.1532c*
Dura no. E1085d
Length (overall) 73 mm,** (pendant) 55 mm, width 27 mm
Ring attachment known only from a site sketch at Yale
* On the Yale card a 'b' is pencilled in, but the item is labelled 'c'.
** Measured from drawing.

Made from a billet of metal, one end extruded into a wire and twisted to form a suspension loop. The ring attachment in place at discovery has since been lost.

208
Copper alloy leaf-shaped pendant
Provenance: E7-W9
Yale no. 1932.1532a
Dura no. E1085e
Length (overall) 92 mm*, (pendant) 67 mm, width 39 mm
*Measured from site sketch.

The attachment ring, *in situ* when found, is now lost.

209
Copper alloy leaf-shaped pendant
Provenance: E7-W9
Yale no. 1938.2136
Dura no. E1085 (part of)
Length 59 mm+, width 33 mm

210
Copper alloy leaf-shaped pendant with (?) ring attachment
Provenance: E7-W9
Location unknown
Dura no. E1085 (part of)
Length 44.5 mm+, width 24 mm
Known only from a site sketch preserved at Yale

Probably a bad drawing of a pendant similar to **207** etc. It is unclear whether a separate ring is intended, or more likely a misunderstood wire loop.

211
Copper alloy leaf-shaped pendant
Provenance: E7-W9
National Museum, Damascus
Dura no. E1067a
Length 50 mm, width 37 mm
Known only from a photograph and sketch at Yale

212
Copper alloy leaf-shaped pendant
Provenance: E7-W9
Yale no. 1932.1534
Dura no. E1157
Length 65 mm, width 35 mm

213
Copper alloy leaf-shaped pendant with chain
Provenance unknown
Yale no. 1938.2127
Dura no. unknown
Length 35 mm

Found still attached to a chain consisting of two figure-of-eight rings and a simple ring.

214
Copper alloy leaf-shaped pendant
Provenance: E7-W9
National Museum, Damascus
Dura no. E1067b
Length 36 mm, width 17 mm, thickness 1–3.5 mm
Known from a site sketch and a photograph preserved at Yale (Damascus negative N119)

215
Small silver (?)* leaf-shaped pendant
Provenance: E7
Yale number 1938.2128*
Dura no. E945
Length 26 mm, width 11.5 mm
* Known from a site card at Yale; the Yale accession card describes it as bronze. Site-register gives E945 as 1932.1530. Location unknown.

Closely similar to an item from Aldborough, including the twisted loop (Bishop 1996, no. 447).

216
Small copper alloy leaf-shaped pendant
Provenance unknown
Yale number 1938.2129
Dura no. unknown
Length 34 mm, width 9.5 mm

Pendants very similar in form are seen on a gold disc-brooch from Syria (Damascus National Museum Inv. 4318/10127: Stadtsmuseum Linz 1987, fig. 12).

217
Small copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2175
Dura no. unknown
Length 36 mm, width 13 mm

218
Small copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2177
Dura no. unknown
Length 36 mm, width 14 mm

Wire loop apparently secured with a blob of solder.

219
Small copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2176
Dura no. unknown
Length 28 mm, width 13 mm

220
Small copper alloy leaf-shaped pendant
Provenance: B8-G3
Yale no. 1932.1531
Dura no. E279
Length *c.*21 mm

Known only from a site drawing preserved at Yale, and Yale number from site-register annotation. Location unknown.

221
Small copper alloy ivy-leaf pendant
Provenance: C3-A1
Yale no. 1938.2475
Dura no. F2040
Length 31 mm, width 11 mm

222
Small copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2174
Dura no. unknown
Length 23 mm+, width 14 mm

223
Small copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2182
Dura no. unknown
Length 30 mm, width 10 mm

224
Small copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2178
Dura no. unknown
Length 25 mm+, width 13 mm

225
Copper alloy leaf-shaped pendant
Provenance: L7-W
National Museum, Damascus
Dura no. G1919
Dimensions unknown
Frisch and Toll 1949, pierced bronze no. 44

This is almost identical to **226**. There is another near-identical piece from Heftrich (Oldenstein 1976, no. 199) and a further very close parallel from Pfaffenberg (*RLÖ* I, pl. IX, fig. 7).

226
Copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2149
Dura no. unknown
Width 35 mm, height 21 mm+, thickness 1–2 mm
Frisch and Toll 1949, pierced bronze no. 45

Probably cut from sheet. Frisch and Toll believed there were traces of a broken fastening-loop at the top above the rivet hole, but this is not evident to me. The broken lunate aperture still contains some iron corrosion from another object.

See **225** for parallels.

227
Copper alloy leaf-shaped pendant
Provenance: J8
National Museum, Damascus
Dura no. I93
Width 36 mm, height 48 mm, thickness 4 mm
Frisch and Toll 1949, pierced bronze no. 46

A heart-shaped openwork casting with broken fastening-loop, probably for a hinge, at the top.

There are parallels with similar decor and style of attachment from Carnuntum (*RLÖ* VII, fig. 56; *RLÖ* IX, cols 79–80, fig. 38), Stockstadt and Zugmantel (Oldenstein 1976, nos 230, 232).

228
Large copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1932.1414
Dura no. unknown
Length 84 mm+, width 59 mm

Thinness of the plate suggests attachment by means of a bent tab, now lost.

The general shape and central aperture resemble early imperial horse harness pendants of Bishop's types 5b–d (Bishop 1988, 148, table 6, fig. 45). Quite similar to a pierced pendant from Straubing (Oldenstein 1976, no. 191).

229
Copper alloy leaf-shaped pendant
Provenance: F3-1
Location unknown
Dura no. F825 (part of)
Length 39 mm, width 22.5 mm
Known only from a sketch on a site card at Yale

Central aperture similar to **228**. In shape it is reminiscent of a pierced terminal from South Shields (Miket 1983, 109, no. 9, fig. 68).

230
Copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.2122
Dura no. unknown
Length 49 mm, width 23 mm

Knife-cuts on the shoulders. A similar piece was found at South Shields (Allason-Jones and Miket 1984, 3.661).

231
Fragmentary copper alloy leaf-shaped pendant
Provenance unknown
Yale no. 1938.3061
Dura no. unknown
Length (including loop) 37 mm+

Still with wire figure-of-eight attachment in place.

232
Copper alloy leaf-shaped pendant
Provenance: Palmyrene Gate (?)*
National Museum, Damascus
Dura no. K145
Length 57 mm, width 28 mm, thickness 1 mm
* Known from a site sketch and photograph at Yale (Damascus negative N142). The sketch gives the provenance as 'Pal. Gate', while the site-register gives 'surface Palmyre [*sic*] gate'. However, the object also appears in Matheson 1992, fig. 17, among objects described as found in Block G.

233
Copper alloy rhomboidal pendant
Provenance unknown
Yale no. 1938.2120
Dura no. unknown
Length 65 mm, width 33 mm

Similar to a piece from Arnsburg (Oldenstein 1976, no. 205).

234
Copper alloy rhomboidal pendant
Provenance: E7-D court
Yale no. 1932.1533
Dura no. E1164
Length 74 mm, width 21 mm

A type seen across the whole empire. An example is known from Volubilis (Boube-Piccot 1994, no. 141) and a pendant of similar form from Villas Viejas, Spain (Fernández 1996, fig. 5:5). See also Vindonissa (Unz and Deschler-Erb 1997, especially no. 1425), and a piece from Buciumi, Romania (Chirila *et al.* 1972, 72, pl. LXXI:25). The same kind, with the twisted wire suspension loop, is known from Aldborough (Bishop 1996, no. 458).

235
Copper alloy rhomboidal pendant
Provenance: J7-W3
Yale no. 1938.5999.1031*
Dura no. G1852 (part of)
Length 56 mm, width 14 mm
*Object marked '1938.2180', but Yale catalogue card notes that this number is wrong; it actually belongs to **338**, so the above number is now assigned.

236
Copper alloy rhomboid pendant
Provenance unknown
Yale no. 1938.3664
Dura no. unknown
Length 51 mm+, width 19 mm

237
Small copper alloy rhomboid pendant
Provenance unknown
Yale no. 1938.2126
Dura no. unknown
Length 30 mm+, width 13 mm

238
Copper alloy rhomboidal pendant
Provenance unknown
Yale no. 1938.2121
Dura no. unknown
Length 66 mm, width 33 mm

Probably part of a complex pendant.

Studs

239
Copper alloy stud
Provenance unknown
Yale no. 1938.3612
Dura no. unknown
Height 14 mm

Examples of such plain studs are known from the hoard of probable horse harness from Wange (Lodewijckx *et al.* 1993, 82, series 4.26, fig. 12).

240
Copper alloy stud
Provenance: C3-B11
Yale no. 1938.3634
Dura no. F2123
Height 12 mm

241
Copper alloy stud
Provenance: 'T[ower] 17'
Yale no. 1938.3629
Dura no. unknown
Height 16 mm

242
Copper alloy stud
Provenance: G7
Location unknown
Dura no. E7
Height 16 mm

Paralleled at Aldborough (Bishop 1996, no. 454).

243
Copper alloy stud
Provenance unknown
Yale no. 1938.3627
Dura no. unknown
Height 14.5 mm

Paralleled at the Saalburg (Oldenstein 1976, no. 503).

244
Copper alloy stud
Provenance unknown
Yale no. 1938.3222
Dura no. unknown
Diameter 19 mm, height 15.5 mm

Paralleled at the Saalburg (Oldenstein 1976, nos 498–501).

245
Copper alloy stud
Provenance unknown
Yale no. 1938.3218
Dura no. unknown
Diameter 30 mm, height 19 mm

Paralleled at the Saalburg (Oldenstein 1976, no. 503).

246
Copper alloy stud
Provenance unknown
Yale no. 1938.3611
Dura no. unknown
Height 14 mm

247
Bone stud
Provenance: E7-W13
Yale no. 1932.1688
Dura no. E1359
Length 18 mm
Russell 1976, 30, no. 2

Quite closely paralleled at Mainz (Mikler 1997, nos 6/7–6/10).

248
Bone stud
Provenance unknown
Yale no. 1934.531b
Dura no. unknown
Length 16 mm
Russell 1976, 30, no. 3

Lathe-turned. Most of the thin rear disc is lost. See a similar piece from South Shields (Allason-Jones and Miket 1984, 2.20). See also examples from Holzhausen and the Saalburg (Oldenstein 1976, nos 475–7).

249
Bone stud
Provenance: G3-64
National Museum, Damascus
Dura no. K50
Length 17 mm
Known from a site sketch and photos at Yale

Lathe-turned bone. See an example from Zugmantel (Oldenstein 1976, no. 479).

250
Bone stud
Provenance unknown
Yale no. 1938.624
Dura no. unknown
Length 18 mm
An elaborately finished example. For a fair parallel, see a piece from the Saalburg (Oldenstein 1976, no. 477).

251
Bone stud fragment
Provenance unknown
Yale no. 1933.533d
Dura no. unknown
Diameter 15 mm

The thin rear disc from a bone stud, decorated with incised circles, and heavily worn and polished.

252
Large ivory stud
Provenance unknown
Yale no. 1931.598
Dura no. unknown
Diameter 39 mm
Russell 1976, 30, no. 1

Lathe-turned, and now laminating and splitting. Most of the thin rear disc has broken away. While this general form is common enough, parallel examples of this size and exotic material are not forthcoming.

253
Bone stud
Provenance: Block G
Location unknown
Dura no. unknown
Diameter *c.*27 mm*
Published in Matheson 1992, fig. 16
* Estimated from a photograph.

254
Copper alloy stud
Provenance unknown
Yale no. 1938.3224
Dura no. unknown
Diameter 19 mm, height 14 mm

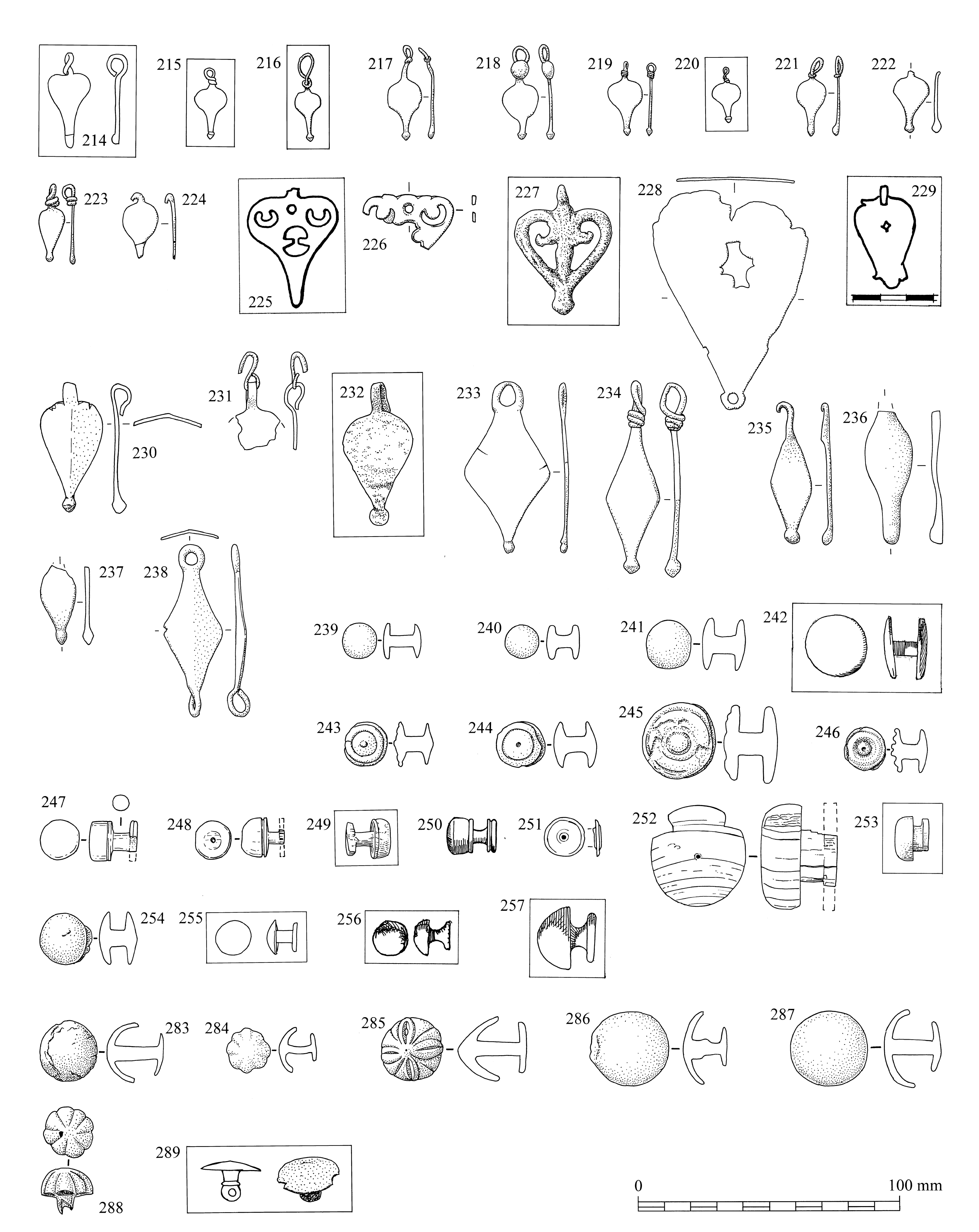


Figure 42 Pendants probably from dress and horse harness, **214** to **238**, studs **239** to **257** (**258** to **282** not illustrated), and **283** to **289**. Copper alloy, except **247–253** (bone or ivory) and **215** (silver?).

255
Copper alloy stud
Provenance: G3-70
Location unknown
Dura no. K132
Length 11 mm

256
Copper alloy stud
Provenance: B3-28
Location unknown
Dura no. G1696
Length 13.5 mm
Known only from a site card at Yale

Paralleled at Zugmantel (Oldenstein 1976, no. 488).

257
Copper alloy stud
Provenance: G2-22
Location unknown
Dura no. E911
Length 21 mm

Paralleled at the Saalburg (Oldenstein 1976, no. 487).

258
Bone stud (not illustrated)
Provenance: N8-W8
Yale no. 1934.531a
Dura no. G1944
Length 16 mm

283
Copper alloy domed stud
Provenance unknown
Yale no. 1938.3220
Dura no. unknown
Diameter 23 mm, height 21 mm

Examples of such studs formed part of the Brigetio horse harness set (horse burial I: Barkóczi 1948, 178, pl. XXX:2, 4, 7, 9). Also paralleled at Buch (Oldenstein 1976, no. 486).

284
Copper alloy domed stud
Provenance unknown
Yale no. 1938.5999.1171
Dura no. unknown
Diameter 17 mm

Eight shallow radial grooves. Broadly similar examples are known from Neckarburken and Butzbach-Degerfeld (Oldenstein 1976, nos 483–4).

285
Copper alloy domed stud
Provenance unknown
Yale no. 1938.3193
Dura no. unknown
Diameter 23 mm, height 25 mm

Decorated with 'coffee-bean' or vulva motifs, like **302** and **303**.

286
Copper alloy domed stud
Provenance unknown
Yale no. 1938.3217
Dura no. unknown
Diameter 29 mm, height 16 mm

287
Copper alloy domed stud
Provenance unknown
Yale no. 1938.3221
Dura no. unknown
Diameter 29 mm, height 22 mm

Paralleled at Aldborough (Bishop 1996, no. 455).

288
Copper alloy domed stud (?)
Provenance: E4-34
Yale no. 1938.3084
Dura no. F492
Diameter 20 mm

Five studs with similar domed heads are known from Great Chesters on Hadrian's Wall (Allason-Jones 1996, no. 46). The decoration is also similar to pieces from Neckarburken and Butzbach-Degerfeld (Oldenstein 1976, nos 483–4).

289
Copper alloy stud with pierced shank
Provenance unknown
Yale no. 1938.3570
Dura no. unknown
Diameter 23 mm
Known from a site sketch and photograph at Yale (negative 973)

290
Copper alloy stud
Provenance: G3-B
Yale no. 1938.2580
Dura no. E920
Diameter 27 mm
Known only from a site card at Yale

Apparently a slightly domed disc with a rear stud. Paralleled at Niederbieber (Oldenstein 1976, no. 512).

291
Copper alloy stud
Provenance: M7-W2
Yale no. 1938.3230
Dura no. F769
Diameter 19 mm

Copper alloy studs (not illustrated)

Cat. no.	Provenance	Yale no.	Dura no.	Height/diam. (mm)	Comments
259	G2-22	1932.1488	E911	h 21, d 26	
260	unknown	1934.637	unknown	h 12, d 15	
261	unknown	1938.3227	unknown	h 17, d 24	
262	M7-W1	1938.3232	F216	h 22, d 26	
263	F3-10	1938.3523	F1166	d 33	
264	unknown	1938.3613	unknown	h 12.5, d 13	
265	unknown	1938.3614	unknown	h 13	
266	unknown	1938.3615	unknown	h 13	
267	unknown	1938.3617	unknown	h 15	slightly domed head
268	unknown	1938.3618	unknown	h 12	
269	unknown	1938.3619	unknown	h 12	
270	unknown	1938.3620	unknown	h 12	slightly domed head
271	unknown	1938.3622	unknown	h 11	slightly domed head
272	unknown	1938.3623	unknown	h 14.5	
273	L7	1938.3624	F1507	h 17	
274	unknown	1938.3625	unknown	h 13	slightly domed head
275	unknown	1938.3628	unknown	h 18	
276	C3-B	1938.3630	F1403	h 17	
277	M8-W6	1938.3631	F1883	h 9	
278	Palm. gate	1938.3632	K265	h 17	
279	M7-W11	1938.3633	F1017	h 21	heavy concretion
280	'X7-4 dep.'	1938.3636	I783	h 15	
281	B2-A1	1938.3637	F253	h 16	
282	M8-W3	1938.3638	F778	h 12.5	

292
Copper alloy stud
Provenance unknown
Yale no. 1938.3229
Dura no. unknown
Diameter 32 mm

293
Copper alloy discoid stud
Provenance: G3-62
National Museum, Damascus
Dura no. K214
Diameter 38 mm
Known only from a Yale site card and a photograph (Damascus N 139)

A similar piece was found at Niederbieber (Oldenstein 1976, no. 512).

294
Copper alloy discoid stud
Provenance unknown
Yale no. 1938.3423
Dura no. unknown
Diameter 36.5 mm
Known from a photograph and site sketch at Yale (photograph 937)

A plain flat disc with a single central stud.

295
Enamelled copper alloy discoid stud
Provenance: G3-70
Yale no. 1938.3566
Dura no. unknown
Diameter 38 mm
See Frisch and Toll 1949, enamelled bronze 32

'Flat, circular button with short stud on the back side; milled edge . . . traces of enamel. Decoration consists of three concentric circles. Traces of red and cobalt blue enamel in the central circles. In the outer circles traces of red, blue and white enamel. Pattern is now undiscernible' (Frisch and Toll 1949, 42).

Similar to some from the hoard of metalwork from Wange villa in Belgium which consists mostly, although not entirely, of horse-gear (Lodewijckx *et al.* 1993, 75, series 4.3 and 4.4, fig. 5).

296
Copper alloy lentoid stud
Provenance: 'St[reet] H'
Yale no. 1938.3192
Dura no. E1095
Length 44 mm
Known from a record card and photograph at Yale

Apparently found with pendant **190**.

Lens-shaped in outline, decorated with longitudinal grooves, and attached via one large stud on the rear.

Studs of this general form were apparently used for both belts and horse harness. Elaborate silver ones are known from complete belt-sets from Budapest (coin-dated after AD 287; Fischer 1988, 177, fig. 4:5) and Silistra, Bulgaria (Fischer 1988, 178–9, fig. 6:5). Plainer studs were found in the Wange hoard of horse-gear (Lodewijckx *et al.* 1993, 76–8, series 4.10, fig. 7). See also South Shields (Allason Jones and Miket 1984, 3.961–3). Studs of similar outline, but with two attachments, are known from Upper Germany (e.g. Zugmantel: Oldenstein 1976, nos 715, 722, etc.).

297
Copper alloy lentoid stud
Provenance unknown
Yale no. 1938.3191
Dura no. unknown
Length 43 mm

Closely similar to **296.**

298
Copper alloy harness mount
Provenance unknown
Yale no. 1938.5999.1030*
Dura no. unknown
Length 45 mm
*Known only from a card, which says '1931 (?)', and photograph at Yale.

A plain stud of this shape, with two fastenings, was found at Zugmantel (Oldenstein 1976, no. 715).

299
Copper alloy lentoid stud
Provenance: G2-28
Yale no. 1932.1490 (part of)*
Dura no. E922
Diameter 32 mm
* Found with terminal **143**.

Apparently of lenticular shape like **296**–**298**.

Decorative strap mounts

300
Copper alloy S-shaped strap mount (?) (not illustrated)
Provenance unknown
Location unknown
Dimensions unknown
Mentioned in Cumont 1926, 261

Described as a copper alloy S 'muni de deux petits tenons' (i.e. either a strap fitting or a misidentified fibula).

301
Copper alloy strap mount (?) (not illustrated)
Provenance unknown
Location unknown
Diameter 55 mm
Mentioned in Cumont 1926, 261

Cumont describes it as: 'A round *plaque*, slightly domed . . . provided with two buttons on the back for fastening . . .'

302
Copper alloy strap mount
Provenance unknown
Yale no. 1938.2574
Dura number unknown
Length 44 mm

Attached with two studs and embellished with a 'coffee-bean' motif, probably representing a vulva, as an apotropaic symbol.

A common type, probably from horse furniture. An example was found in the Wange hoard of horse harness (Lodewijckx *et al.* 1993, 81, series 4.19, fig. 9). See also examples with attached pendants from the Saalburg (Oldenstein 1976, nos 267–8). Others have been found at Aldborough (Bishop 1996, no. 440), Brancaster (Hinchliffe and Green 1985, 209, no. 38, fig. 89), Vindolanda (Bidwell 1985, 119, no. 18, fig. 40), South Shields (Allason-Jones and Miket 1984, 3.870–1), Saalburg (Oldenstein 1976, nos 269–70), Niederbieber (Oldenstein 1976, no. 272), Zugmantel (*ORL* B8, pl. XII:27) and Eining (Gschwind 1998, nos 15–16). Examples are also known from Ocaña and Villasequilla de Yepes, Spain (Fernández 1996, fig. 8:6–7).

303
Copper alloy strap mount
Provenance: M7-H3 (?)*
Yale no. 1938.3194
Dura no. 'F1654?'*
Length 21 mm
* The site-register gives F1654 as '2 coins, needle', making the identification with this object, and the provenance, highly suspect.

A small example like this is known from Vindolanda (Bidwell 1985, 119, no. 18, fig. 40).

304
Copper alloy strap mount
Provenance unknown
Yale no. 1938.2573
Dura no. unknown
Length 34 mm

The terminal is probably a broken loop for attachment of a pendant, the whole resembling single-piece castings from Saalburg, Wiesbaden, Zugmantel (Oldenstein 1976, nos 857–9) and Colchester (Bishop 1991, 26, fig. 5.1:A, no. 12).

305
Copper alloy lunate strap mount
Provenance unknown
Yale no. 1938.2266
Dura no. unknown
Width 17 mm

Possibly a mount from a bridle: see those recovered from a horse burial at Beuningen, Netherlands (Zwart 1998, 4–6). Similar closed *lunulae* with ball terminals are known in the form of pendants from Germany, e.g. Munningen (Oldenstein 1976, no. 450). For an enamelled example from South Shields, see Allason-Jones and Miket 1984, no. 3.770.

306
Copper alloy lunate strap mount
Provenance: G2-45
Yale no. 1932.1603
Dura no. E1140
Width 29 mm

307
Copper alloy peltate strap mount
Provenance: M8-W6
Yale no. 1938.2086
Dura no. unknown
Height 41 mm, width 38 mm
Frisch and Toll 1949, pierced bronze no. 27

Similar in form to one from Feldberg (Oldenstein 1976, no. 638). There are a number of related pieces from the hoard of horse harness fittings from Wange, Belgium (Lodewijckx *et al.* 1993, 78, series 4.15, fig. 8). See also examples from Buciumi, Romania (Chirila *et al.* 1972, 75, pl. LXXV: 4–5), and Siscia (Koscevic and Makjanic 1995, 17, no. 253, pl. 29).

308
Copper alloy peltate strap mount
Provenance unknown
Yale no. 1938.2090
Dura no. unknown
Height 26 mm, width 33 mm
Frisch and Toll 1949, pierced bronze no. 32

Closely paralleled at Zugmantel (Oldenstein 1976, no. 637).

309
Copper alloy peltate strap mount
Provenance: E7-S.St
Yale no. 1938.3106
Dura no. E715
Length 34 mm, thickness 2.5 mm

No exact parallels known to me.

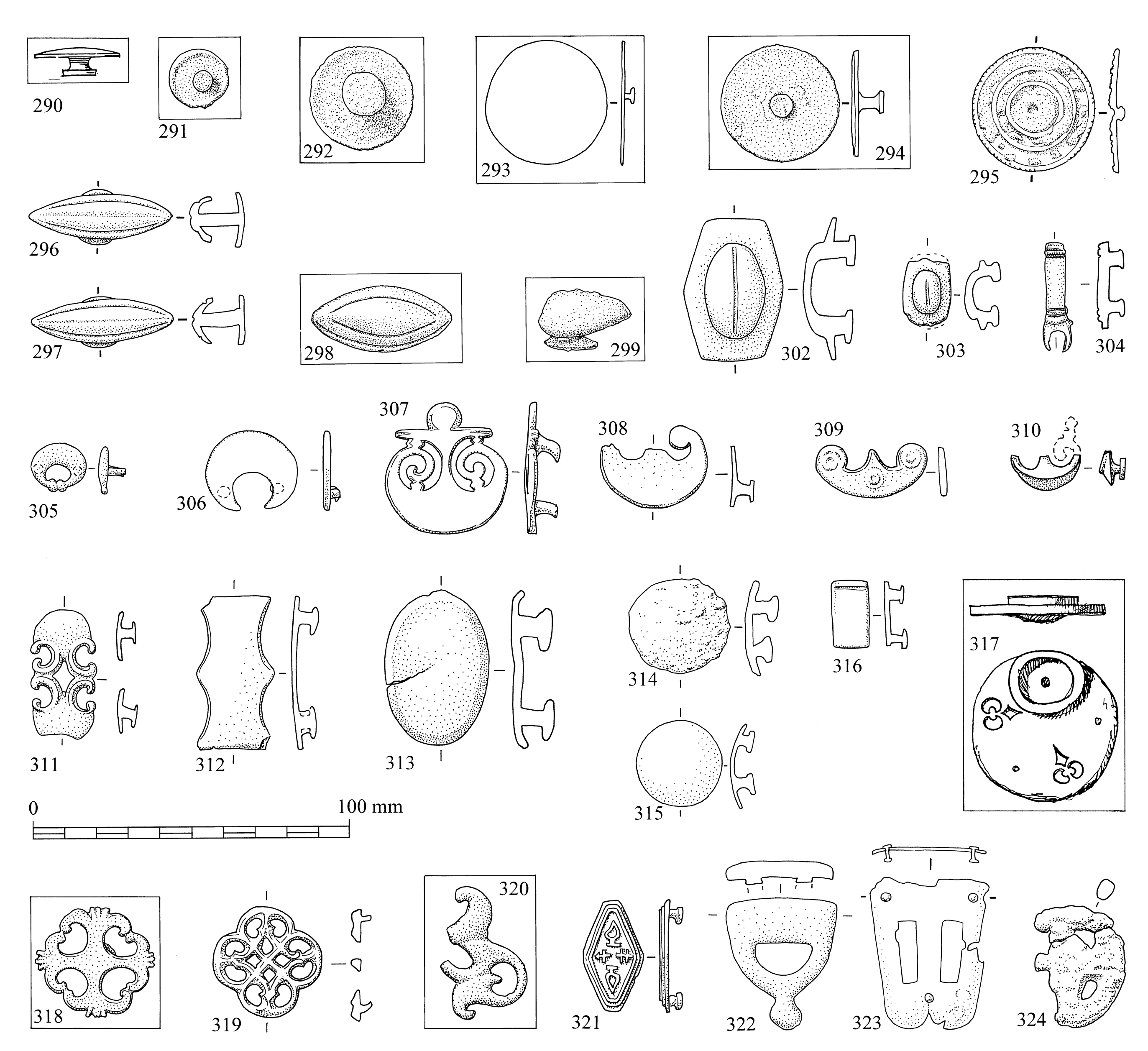


Figure 43 Copper alloy studs and strap mounts (**290** to **321**) and other fittings (**322** to **324**).

310

Copper alloy peltate strap mount
Provenance: G3-63
Yale no. 1938.2319
Dura no. unknown
Width 22 mm
Frisch and Toll 1949, pierced bronze no. 31

311

Copper alloy double-peltate strap mount
Provenance unknown
Yale no. 1938.2092
Dura no. unknown
Length 41 mm+
Frisch and Toll 1949, pierced bronze no. 29

Identical fittings occur as bridle mounts on harness from Mözs, Hungary (Palágyi 1989, 135, fig. 9:1) and South Shields (Allason-Jones and Miket 1984, 3.884). A good example is seen in the Wange hoard (Lodewijckx *et al.* 1993, 81, series 4.17, fig. 8). There is an identical piece from Cirencester, England (Wacher and McWhirr 1982, 112, fig. 37, no. 108). There are other fittings using the same motif, e.g. four-*pelta* fittings from Feldberg (Oldenstein 1976, no. 275) and Veguilla de Oreja, Spain (Fernández 1996, fig. 8:11).

312

Copper alloy strap mount
Provenance unknown
Yale no. 1938.3190
Dura no. unknown
Length 48 mm+

The best parallel is from Sarmizegetusa (Dawson 1990, 7, no. 5, fig. 3). See also a piece from Wiesbaden (Oldenstein 1976, no. 854) and another from Chichester (Bishop 1991, 26, fig. 5.2:C, no. 2).

313

Copper alloy oval strap mount
Provenance: G1-61
Yale no. 1932.1482
Dura no. E1332
Length 48 mm
Details from Yale accession card

A piece from Saalburg is similar (Oldenstein 1976, no. 716).

314

Copper alloy discoid strap mount
Provenance: 'Tower 23–S.O.' (*sud-ouest*?)
Yale no. 1938.3196
Dura no. K196
Length 31 mm

Pieces of this form are quite common in Germany, e.g. Holzhausen and Niederbieber (Oldenstein 1976, nos 686–8). Numerous studs of the same type were found in the Wange hoard (Lodewijckx *et al.* 1993, 76 series 4.5, fig. 6). Also paralleled at Carnuntum (*RLÖ* XXXI, pl. 17:22) and South Shields (Allason-Jones and Miket 1984, 3.956).

315

Copper alloy discoid strap mount
Provenance unknown
Yale no. 1938.3408
Dura no. unknown
Diameter 27 mm

316

Copper alloy rectangular strap mount
Provenance: E7-W9
Yale no. 1932.1645
Dura no. E1087
Length 22 mm

There are no very close parallels for this piece. It shares a provenance with a 'silver' pendant (**158**) and a large group of copper alloy ivy-leaf pendants

(see **211** etc.), and is probably from horse harness.

317
Copper alloy disc
Provenance: J7-W2
Location unknown
Dura no. G1883
Diameter 44 mm

Known only from a site sketch at Yale, it is nearly identical to **28**. The function of the attached ring, if indeed it is part of the object and not a separate component simply fused on by corrosion, is unclear.

318
Copper alloy cruciform stud
Provenance unknown
Yale no. 1938.2147
Dura no. unknown
Diameter 37 mm, thickness 2 mm (with stud 9 mm)
Frisch and Toll 1949, pierced bronze no. 25

Cruciform, with peltate apertures and a strong central attachment stud.

A fair parallel is known from Richborough (Bushe-Fox 1928, 46, no. 33, pl. XIX).

Studs of this general shape are quite widely known, e.g. Weissenburg (*ORL* B72, pl. VII:27–9). Several examples are known from Dacia (Dawson 1989, fig. 4:12–14).

319
Copper alloy openwork mount
Provenance: J7-W6
Yale no. 1938.2182a
Dura no. H137
Diameter 35 mm, thickness 3 mm
Frisch and Toll 1949, pierced bronze no. 26

Four cast-on attachment pins on the back. A piece of identical pattern is known from Dacia (Buciumi, Romania; Dawson 1989, 365, fig. 5:7). There is a fitting, perhaps a buckle, of closely similar form from Risnov (Dawson 1989, 365, fig. 7:7).

320
Pierced copper alloy strap mount
Provenance unknown
Yale no. 1938.3312
Dura no. unknown
Length 39 mm

Similar asymmetric trumpet-motif fittings are well known from Upper Germany (e.g. Pfünz, Saalburg: Oldenstein 1976, nos 899, 908). It could be from a belt-set or horse harness. It is generally similar, for instance, to harness mounts from the Brigetio horse burials (Barkóczi 1948, 178, pl. XXXII:1–3).

321
Enamelled copper alloy strap mount
Provenance unknown
Yale no. 1929.522
Dura no. unknown
Length 35 mm, width 19 mm
Frisch and Toll 1949, enamelled bronze no. 30

Probably represents a hexagonal shield design. None of the presumed enamelling survives.

The motif of back-to-back ivy-leaves is seen on an enamelled belt plaque from Osterburken (Oldenstein 1976, no. 814).

322
Copper alloy strap mount (?)
Provenance: G3-63
Yale no. 1938.2464
Dura no. K66
Length 41 mm

323
Copper alloy strap mount (?)
Provenance: G5-33
Yale no. 1938.3118
Dura no. G1766
Length 47 mm

Copper rivets through pierced plate.

324
Copper alloy strap mount (?)
Provenance unknown
Yale no. 1938.3458
Dura no. unknown
Diameter *c.* 38 mm
Frisch and Toll 1949, pierced bronze no. 86

Equestrian equipment

325
Copper alloy spur (?)
Provenance: M7-W11
Yale no. 1933.664a
Dura no. F802
Length 154 mm (around curve), 105 mm (across chord)

Probably a spur (L. Allason-Jones, pers. comm.). The hinge is unusual. However, the general size, conformation and the asymmetric positioning of the aperture, presumed to be for a spike, all fit with the identification (see Dixon and Southern 1992, fig. 26). See a parallel from South Shields (Allason-Jones and Miket 1984, 3.685). Two copper alloy spurs from Corbridge share the asymmetric location of the point attachment, and its manufacture as a separate component (iron?), now lost (Shortt 1959, 70, nos 7–8, fig. 3).

326
Copper alloy spur (?)
Provenance unknown
Yale no. 1938.3208
Dura no. unknown
Length 56 mm

The shorter half of a hinged object closely similar to **325**.

327
Iron and copper alloy snaffle bit
Provenance: G5-17
Yale no. 1934.708a & 1934.708b
Dura no. J5
708a Length 74 mm, width 62 mm
708b Length 75 mm, width 62 mm+

A site card at Yale shows that 708a and 708b were found together, and belong to the same bit. 708a has been stripped down to the metal. The ring articulating with the other bit components is almost worn through. 708b is still encrusted with corrosion products, and preserves a fragment of an iron bit-link.

I know of no western parallels, although Roman provincial types are not exhaustively known. It could be a local or Partho-Sasanian form.

328
Copper alloy snaffle bit cheek-piece
Provenance: G5-33(?)
Yale no. 1938.3046
Dura no. G1776 (?)*
Length 82 mm
* Site-register describes entirely different objects under G1776, and a different provenance. These are therefore suspect.

Apparently openwork. Similar to pieces from the Saalburg (Oldenstein 1976, nos 965, 967–8), and roughly paralleled at Weissenburg (*ORL* B72, pl. VIII:3). A bit from Inota Mound 1, Hungary, has a similar bar (Palágyi 1989, 128, fig. 3:1), while the bit from the Tihany horse burial resembles the curved element (Palágyi 1989, 133, fig. 6). Long bars also occur on the cheek-pieces of a late Roman bit from Monte Gelato, Italy (Potter and King 1997, 259, no. 18, fig. 181).

329
Copper alloy snaffle bit cheek-piece
Provenance: G1-36
Yale no. 1932.1434
Dura no. E561
Length 90 mm, width 63 mm
Frisch and Toll 1949, pierced bronze no. 15

A harness fitting of identical decorative pattern, but with different attachments, was found in Dacia (Fig. 33: Buciumi, Romania: Dawson 1989, 365, fig. 6:1). Similar examples were found in the Frenz vehicle grave (Lehner 1923, pl. III:b, no. 14) and in a late-Roman metal hoard at Monte Gelato near Rome (Potter and King 1997, 246, no. 25, figs 171, 178).

330
Copper alloy snaffle bit cheek-piece
Provenance: J7-W6
Yale no. 1938.2134
Dura no. unknown
Width 63 mm+
Frisch and Toll 1949, pierced bronze no. 16
Similar to **329**.

331
Copper alloy snaffle bit cheek-piece
Provenance: G5-29
Yale no. 1934.707
Dura no. G1640
Length 85 mm, width 59 mm
Frisch and Toll 1949, pierced bronze no. 19

332
Copper alloy snaffle bit cheek-piece
Provenance: X7-5
Yale no. 1938.2415
Dura no. I741
Length 57 mm+, width 66 mm, thickness 4 mm
Frisch and Toll 1949, pierced bronze no. 21

Similar to a piece from Vindonissa (Unz and Deschler-Erb 1997, no. 1960).

333
Copper alloy snaffle bit cheek-piece
Provenance: G6-A8
Yale no. 1938.2160
Dura no. E1388
Length 52 mm+, width 51 mm+, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 22

Similar to **332**. Probably part of a complex bit. (See a find from Kastell Feldberg: *ORL* B10, pl. VI:22–4, and p. 25, no. 41.) A plaque of identical decorative layout, but with different methods of attachment, was found at Buciumi in Dacia (Dawson 1989, fig. 5:14).

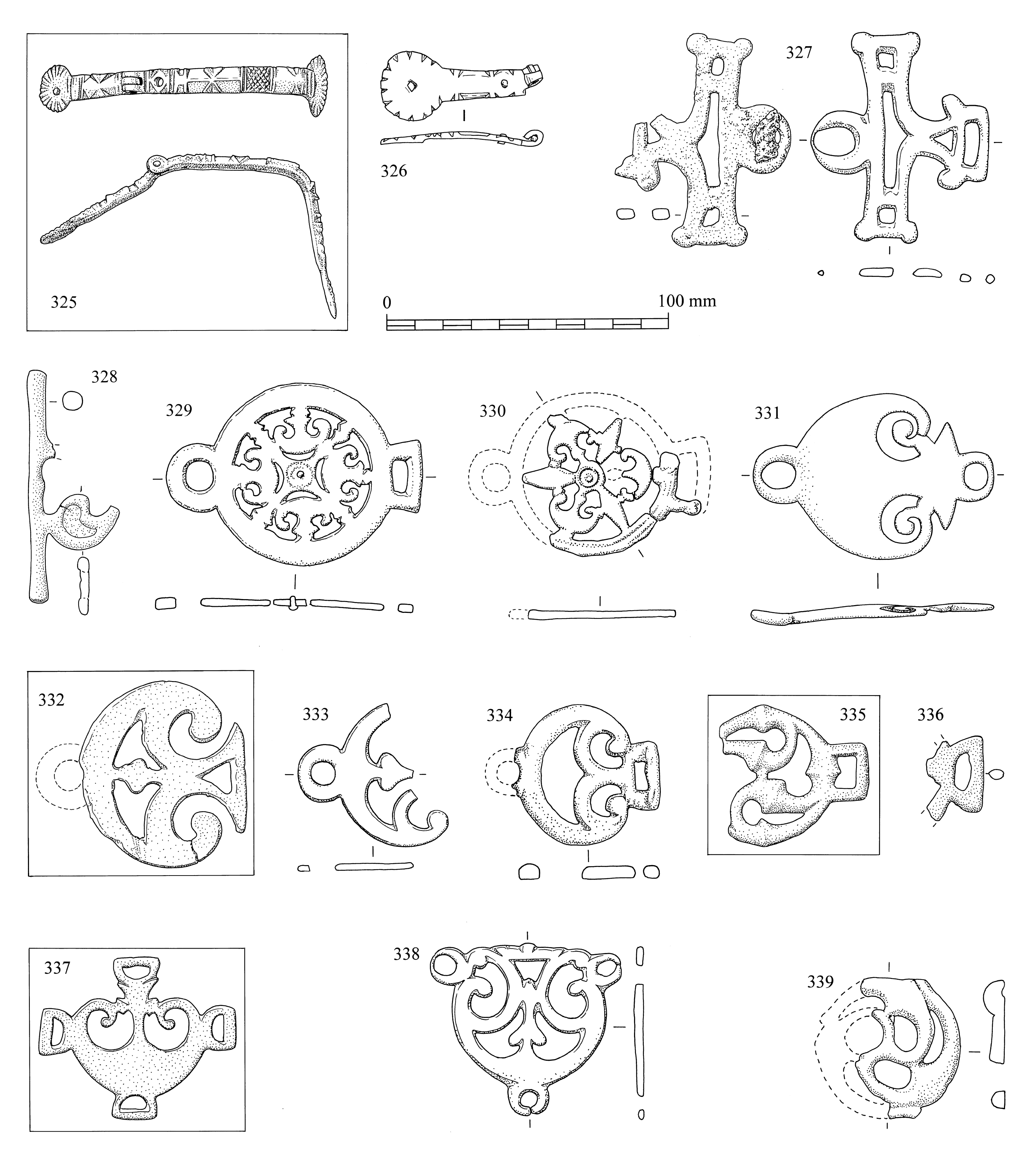


Figure 44 Copper alloy spurs (**325**, **326**), cheek-pieces from bits (**327** to **336**), and harness fittings (**337** to **339**).

334

Copper alloy snaffle bit cheek-piece

Provenance unknown
Yale no. 1938.2162
Dura no. unknown
Length 51 mm+, width 49 mm, thickness 4 mm
Frisch and Toll 1949, pierced bronze no. 18

335

Copper alloy snaffle bit cheek-piece

Provenance: E8-23
National Museum, Damascus
Dura no. H121
Length 50 mm+, width 50 mm, thickness 5–10 mm
Frisch and Toll 1949, pierced bronze no. 17

A cheek-piece with similar La Tène-inspired openwork decoration is known from South Shields (Allason-Jones and Miket 1984, 3.672).

336

Copper alloy snaffle bit cheek-piece

Provenance unknown
Yale no. 1938.3298
Dura no. unknown
Width 28 mm+
Frisch and Toll 1949, pierced bronze no. 87

Heavily corroded.

337

Copper alloy four-way strap junction

Provenance: J8-W6
National Museum, Damascus
Dura no. H346
Height 56.5 mm, width 69 mm, thickness 4 mm
Frisch and Toll 1949, pierced bronze no. 20

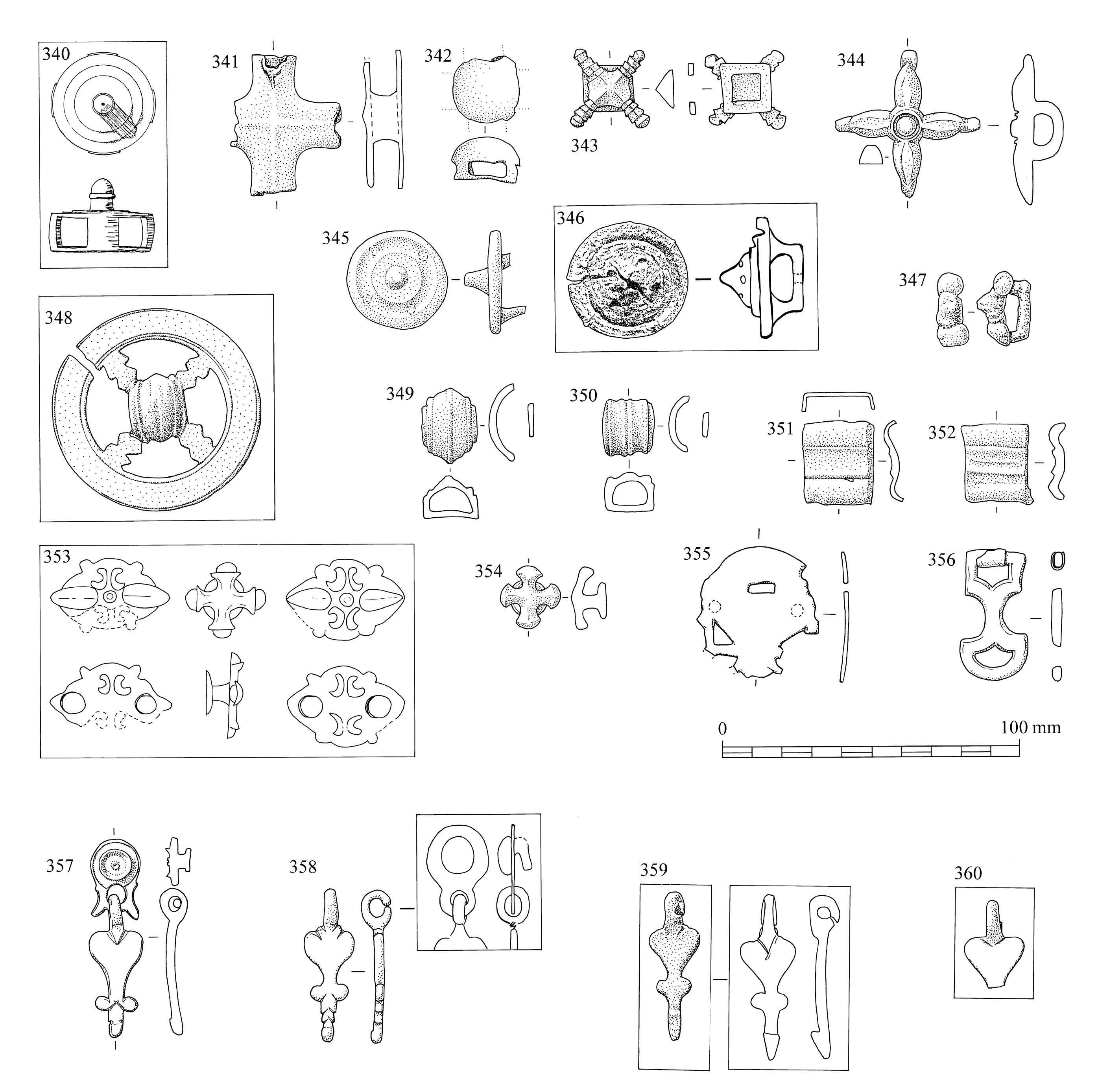


Figure 45 Copper alloy horse harness fittings (**340** to **360**).

338

Copper alloy three-way strap junction

Provenance: L7-W28
Yale no. 1938.2180
Dura no. F2199
Height 60 mm, width 67 mm
Frisch and Toll 1949, pierced bronze no. 23

Design similar to **332**, **333** and **334**. The attachment rings are heavily worn.

339

Copper alloy strap junction

Provenance: C7
Yale no. 1938.2096
Dura no. unknown
Diameter 50 mm
Frisch and Toll 1949, pierced bronze no. 3

A casting with no obvious means of attachment. Possibly a strap junction: straps could have been attached through the apertures in the pattern.

Strap junctions of similar form and decoration are known from the Brigetio horse burials (Barkóczi 1948, 178, pl. XXXI:1, 2, 7, 9).

340

Copper alloy bridle mount

Provenance: G5-a1
Yale no. 1932.1615
Dura no. E1306
Diameter 33 mm
Known only from a record card at Yale

341

Copper alloy bridle mount

Provenance unknown
Yale no. 1938.2465
Dura no. unknown
Height 47 mm, width 37 mm+

A hollow casting, apparently blocked with soil. Identification suggested by M. Bishop (pers. comm.).

There is a perfect parallel in Chesters museum on Hadrian's Wall. Similar objects are also known from Newstead (Curle 1911, pl. LXXVII), and perhaps Lauriacum (*RLÖ* X, fig. 36:8). Objects of apparently similar function are known from Buciumi, Romania (Dawson 1989, 364, fig. 4:12–14). Similar cruciform fittings, with *peltae*/volutes in the corners, were found at Buciumi (Chirila *et al.* 1972, 73, pls LXXII:1, LXXV:1–2), and at Kastell Weissenburg (Junkelmann 1992, fig. 2).

342

Copper alloy bridle mount (?)

Provenance unknown
Yale no. 1938.2153
Dura no. unknown
Diameter 24 mm

343

Copper alloy bridle mount (?)

Provenance unknown
Yale no. 1938.2154
Dura no. unknown
Diagonal 34 mm

344

Copper alloy bridle mount (?)
Provenance unknown
Yale no. 1938.2152
Dura no. unknown
Diameter 47 mm, thickness (including loop) 17 mm
Frisch and Toll 1949, pierced bronze no. 24

Frisch and Toll describe it as a 'four-petaled rosette-shaped . . . button'.

345

Possible copper alloy bridle mount (?)
Provenance: 'E4-SW West Corner N'
Yale no. 1933.667
Dura no. F383
Diameter 33 mm

346

Copper alloy bridle mount (?)
Provenance: X7-30
National Museum, Damascus
Dura no. I664
Diameter 39.5 mm

Details from record cards preserved at Yale, which record: 'cast bronze, two deep concentric circles, four perforations, square underside. Cracked, corroded.'

347

Copper alloy bridle mount (?)
Provenance unknown
Yale no. 1938.3276
Dura no. unknown
Length 24 mm

348

Copper alloy bridle mount (?)
Provenance: G7-St.D
National Museum, Damascus
Dura no. I70
Diameter 71 mm, thickness 1.5 mm (boss 10 mm)
Frisch and Toll 1949, pierced bronze no. 13

The central element is matched by **349**.

349

Copper alloy bridle mount (?)
Provenance: G8-St.D
Yale no. 1938.2466
Dura no. I88
Length 26 mm

A piece of similar shape is known from Siscia (Koscevic and Makjanic 1995, 17, no. 150, pl. 19). See also mounts from Környe (Gschwind 1998, fig. 8).

350

Copper alloy bridle mount (?)
Provenance: C3-D3
Yale no. 1938.2469
Dura no. F2116
Length 20 mm, width 17 mm, thickness 13 mm

351

Copper alloy bridle mount (?)
Provenance unknown
Yale no. 1938.2265
Dura no. unknown
Length 28 mm, width 23 mm, thickness 6 mm

Box-shaped mounts with top resembling two half-cylinders side by side were found in a horse burial at Brigetio (Barkóczi 1948, pl. XXX:13–14, 16, 17). Other examples are known from Eining (Gschwind 1998, nos 6–7).

352

Copper alloy bridle mount (?)
Provenance unknown
Yale no. 1938.3311
Dura no. unknown
Length 26 mm, width 21 mm

Has corner 'legs'; perhaps originally it was box-shaped with four side apertures.

353

Set of three copper alloy harness ornaments
Provenance: G3-NE
National Museum, Damascus
Dura no. K4
Diameter of cruciform stud *c.*27 mm, others *c.*40 mm wide
Frisch and Toll 1949, pierced bronze no. 30

Three heavily oxidized decorative studs, probably from horse harness. The cruciform stud closely resembles **354**.

354

Copper alloy cruciform harness stud
Provenance unknown
Yale no. 1938.3195
Dura no. unknown
Diameter 20 mm

Very similar studs were found as part of the Brigetio horse harness (Barkóczi 1948, pl. XXX:6, 10). See also Siscia (Koscevic and Makjanic 1995, 17, no. 155, pl. 19) and Kastell Weissenburg (Junkelmann 1992, fig. 2).

355

Pierced copper alloy plate: horse harness (?)
Provenance unknown
Yale no. 1938.3119
Dura no. unknown
Length 44 mm+, thickness 1.5 mm
Frisch and Toll 1949, pierced bronze no. 90

Paralleled at Heftrich and Zugmantel (Oldenstein 1976, nos 953, 955), and Brigetio (Barkóczi 1948, 178, pl. XXXII:10, 13).

356

Copper alloy harness pendant: rein attachment (?)
Provenance: G3-79
Yale no. 1938.2098
Dura no. K213
Length 45 mm

A fragment of a copper-coloured attachment strip still adheres.

Examples are known from Britain – e.g. South Shields (Allason-Jones and Miket 1984, 188 3.591) and Castledykes, Lanarkshire (Hunterian Museum, Edinburgh) – to Upper Germany (Zugmantel: Oldenstein 1976, no. 885) and the Danube lands (Sarmizegetusa: Dawson 1990, 7, no. 12, fig. 3). Pieces of this form are seen in the Brigetio horse harness material (Barkóczi 1948, pl. XXXI:3, 6, 8). Other recent Hungarian finds show they were used on bridles (Kozámisleny and Baláca: Palágyi 1997, 467, figs 6.69, 6.70:k, n, 6.71, 6.72, and 6.74:II); it appears from these finds that such objects may have had more than one use, including linking reins or attaching reins or bridle-straps to the bit (Lawson 1978, fig. 10:6).

357

Copper alloy harness pendant
Provenance: N8-SW Angle
Yale no. 1932.1600
Dura no. E1122
Length (overall) 67 mm, (pendant) 48 mm, width 18 mm
Frisch and Toll 1949, pierced bronze no. 47

The pendant motif appears to consist of an ivy-leaf tipped with a phallus.

A common type of horse harness mount. A closely similar fitting comes from a bridle from a horse burial at Tihany, Hungary (Palágyi 1989, 132 fig. 6). Almost identical pendants were attached by studs exhibiting a variety of shapes (Bishop and Coulston 1993, 157 fig. 112). This particular example is closely related to pieces from Zugmantel (Oldenstein 1976, nos 262, 264). See also pieces from Augst, Switzerland (Deschler-Erb and Schwarz 1993, 11–12, fig. 5:2).

358

Copper alloy harness pendant
Provenance: G5-16
Yale no. 1934.706 (part of)
Dura no. unknown
Length 52 mm, width 17 mm
Frisch and Toll 1949, pierced bronze no. 48

Identical to **357**. A site sketch at Yale shows it still had a stud attachment when found.

The sketch of the now lost fastening-loop closely resembles one from Zugmantel (Oldenstein 1976, no. 263).

359

Copper alloy harness pendant
Provenance: Wall Street*
National Museum, Damascus
Dura no. K46
Length 53 mm, width 18 mm
Frisch and Toll 1949, pierced bronze no. 49
Otherwise known only from a site sketch and photograph at Yale (negative K32).
* 'N Wall' according to the site card.

Identical to **357**. Similar to pieces from Cannstatt (Oldenstein 1976, no. 265) and Verulamium (Bishop 1991, 26, fig. 5.1:B, no. 5).

360

Fragmentary copper alloy harness pendant
Provenance unknown
Yale no. 1938.2123
Dura no. unknown
Length 29.5 mm+
Known only from a unnumbered photograph at Yale

361

Pierced copper alloy 'saddle plate'
Provenance: G3-55
National Museum, Damascus
Dura no. K59 (part of)
Length 90 mm, width 80 mm, thickness 1.5 mm
Frisch and Toll 1949, pierced bronze no. 74; the drawing reproduced here, which shows important additional details, is taken from a site sketch preserved at Yale.

Found with **362**, and apparently strap ends **139** and **140**. Note the T-shaped projections, which were clearly intended to lock into the matching apertures on **362**, the whole forming a link between two broad but thin straps. The fitting was adjustable; three different positions were possible (M. Bishop, pers. comm.). In general terms, these seem similar to the decorative saddle plates known from early imperial horse equipment (suggested by M. Bishop, pers. comm.; see Bishop 1988, 110, 131–3, figs 37–8, especially Type 6). However, the identification is far from clear. It is not evident, for example, why plates which would have a purely decorative, pendant function should be adjustable. Certainly, they are not substantial enough to have withstood any very heavy load.

Very similar plates were found at Zugmantel (Oldenstein 1976, nos 1080–1).

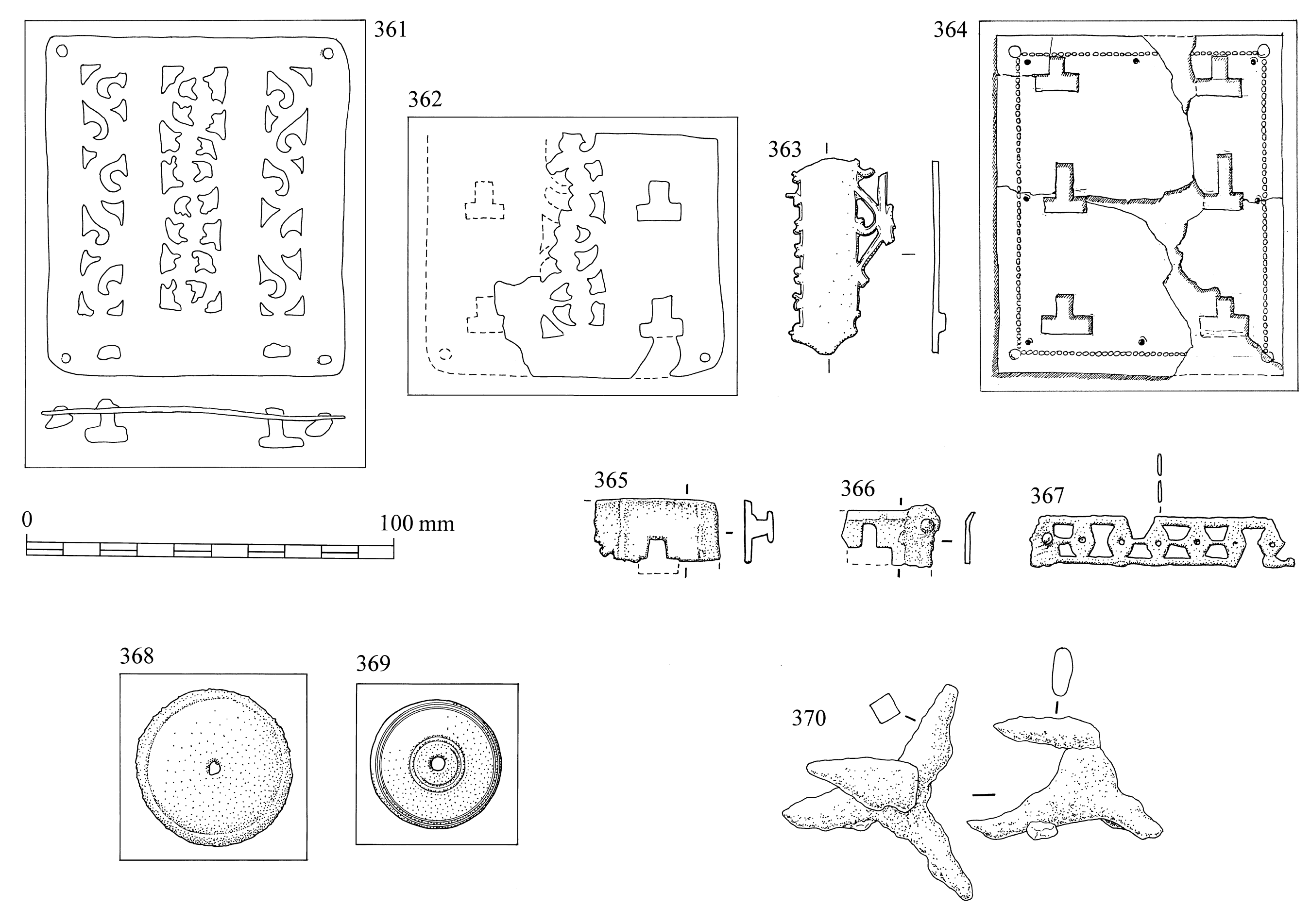


Figure 46 Copper alloy 'saddle plates' (**361**to **367**) and *phalerae* (**368** to **369**) with iron caltrop (**370**).

362

Fragment of copper alloy 'saddle plate'
Provenance: G3-55
Location unknown
Dura no. K59 (part of)
Height 66 mm+, width 61 mm+
Known from a site card at Yale (see **361**)

The T-shaped apertures are clearly intended to engage with the T-shaped lugs on the rear of **361**. A plate from Niederbieber bears similar motifs (Oldenstein 1976, no. 1070). A similar single fitting was found in Grave 74 at Grossprüfering, near Regensburg (Fischer 1990, pl. 108:1–2).

363

Fragment of copper alloy 'saddle plate'
Provenance: G1-44
Yale no. 1932.1422
Dura no. E1050
Height 53 mm+, width 29 mm+, thickness 2 mm+
Frisch and Toll 1949, pierced bronze no. 73

A fragmentary plate with decoration like **361**, and similar to examples from Zugmantel (Oldenstein 1976, nos 1080–1) and Sucidava, Romania (Tudor 1965, fig. 9:12).

364

Copper alloy 'saddle plate'
Provenance: G1-61
Yale no. 1932.1525*
Dura no. E1331
Length 90 mm, width 76 mm
Known only from a site sketch preserved at Yale, on which is noted: 'edge decorated with bead design & 8 nailholes'. **366** may be a fragment of this.
* This number is annotated in the site-register entry for E1331.

A plate with the same pattern of T-shaped apertures is known from Volubilis (Boube-Piccot 1994, no. 212; a lead example, perhaps a test-casting for a two-piece mould). There is a rather more elaborate copper alloy version of the same kind of plaque from the same site (Boube-Piccot 1994, no. 211).

365

Fragment of copper alloy 'saddle plate'
Provenance: C3-B8,
Yale no. 1938.3197
Dura no. 2136
Length 34 mm

Part of a plate with the same T-shaped apertures as **364.**

366

Fragment of copper alloy 'saddle plate'
Provenance unknown
Yale no. 1938.5999.1176
Dura no. unknown
Length 26 mm

Possibly a fragment of **364**. A fragment of a plate with remains of a T-shaped aperture, and remains of a corner rivet with a possible washer on the reverse.

367

Pierced copper alloy 'saddle plate' fragment
Provenance: B2-A25
Yale no. 1938.2184
Dura no. F1823
Length 70 mm, width 14 mm, thickness 1 mm
Frisch and Toll 1949, pierced bronze no. 84

A fragment which corresponds closely to certain first-century saddle plates (M. Bishop, pers. comm.; Bishop 1988, 110, 133, type 6, fig. 38). Identical to an object from Vindonissa (Unz and Deschler-Erb 1997, no. 1885), and similar to a piece from Wiesbaden (Oldenstein 1976, no. 834). See also Augst (Deschler-Erb *et al.* 1991, 72, no. 82).

368

Copper alloy phalera
Provenance unknown
Yale no. 1938.3533
Dura no. unknown
Diameter 42 mm

369

Copper alloy phalera
Provenance unknown
Yale no. 1928.518
Dura no. unknown
Diameter 35 mm

370

Iron caltrop
Provenance unknown
Yale no. 1938.5999.1177
Dura no. unknown
Width 57 mm

A damaged example, with one point bent over. The caltrop, a tetrahedron of spikes, always landed with a point upwards when scattered on the ground. They were especially effective against cavalry (Herodian 4.15.2–3; Stephenson 1999, 103). Known as *triboli* or *tribuli*, they were used by the Romans. Examples are known from Haltern (Harnecker 1997, nos 896–9), Caerleon (Nash-Williams 1932, fig. 22; Bishop and Coulston 1993, 155) and Vindonissa (Unz and Deschler-Erb 1997, no. 291).

Helmets and head protection

The material relating to helmets may be divided into two groups. First, there is the only complete helmet, the iron example from the Tower 19 countermine. This 'Persian' helmet is not a known Roman type but does relate to Asian traditions. The second group consists of a small number of fragments from helmets which were all of undoubted Roman design.

The 'Persian' helmet

In the countermine under Tower 19 a helmet made entirely of iron was found (**371**: Figs 47 and 48). It lay on its side, crushed by the collapse of the tunnel (James 1986a, fig. 14). Though it lay close to the tangled mass of bodies of Roman soldiers (Fig. 13), it is of no known Roman type, and neither was the sword with jade pommel found beside it (**532**). It is possible that both belonged to an isolated corpse, which may have been that of one of the attackers; it lay a couple of metres away, close to the junction with the Persian siege mine (p. 37).

The structure of the helmet is described in detail in the catalogue, and its affiliations have been fully considered elsewhere (James 1986a). Briefly, it differs from contemporary Roman helmets in virtually all aspects of its design and construction, consisting of a tall helmet bowl made in two halves, joined along the mid-line by a separate strip of iron; a nose-guard ('nasal', now lost) anchored by wings in the form of 'eyebrows'; and a pendant camail of iron rings instead of an integral plate neck-guard and hinged cheek-pieces. This construction is quite alien to the middle imperial Roman milieu (to which all the other Dura helmet fragments clearly belong) and provides further evidence for assuming that the helmet belonged to a member of the attacking army.

There are two major points of interest regarding this helmet. First, it is the only well-dated helmet which can be attributed to the Sasanian side with fair confidence. Other helmets probably of Sasanian date are known but details of provenance, and especially of dating, are shaky (James 1986a, 117–20). However, the Sasanian army consisted not only of Persians but of contingents from many subject peoples from Mesopotamia to Afghanistan, and so it can only be assigned to the Persian empire as a whole, and not specifically to Iran itself (James 1986a, 123).

The second major point is that this helmet provides the first well-dated and plausible prototype for many of the most salient features of fourth-century Roman helmets. These were of forms utterly different from those of the preceding four centuries. Examples are now known from Britain to Jordan (see catalogue, and James 1986a). I have argued elsewhere that the occasion and probable reason for the introduction of these new types was the 'nationalization' of arms production under the Tetrarchy, when large new centralized factories (*fabricae*) were created and quantity became more important than quality; the new helmets were simpler to mass-produce and were often crudely made (James 1988, 271–3). However, the source of inspiration for the new designs must also be considered, and an obvious candidate is Persia, whence so much else (not least elements of official dress and ceremonial) was drawn at the time. Hitherto the problem has been the absence of well-dated evidence for the nature of Sasanian helmets in the crucial period, the mid to late third century.

This helmet from Dura is exactly the sort of evidence that was needed, and does indeed show the essential characteristics which appear on Roman helmets from about AD 300 onwards: a bipartite bowl with a riveted fore-and-aft connecting strip, 'eyebrows' and nasal. The fourth-century Roman types may indeed now be regarded as somewhat Romanized pieces of Persian inspiration (for a more detailed discussion, see James 1986a).

The Roman helmet fragments

The remainder of the material, such as it is, consists of a small number of fragments of iron and copper alloy helmets of well-known Roman types. There is a virtually complete iron cheek-piece (**372**); a fragment of an iron helmet bowl (**373**); two copper alloy crest reinforcing bars (**374** and **375**) which may come from a single helmet (if indeed **375** is from a helmet at all); and a copper alloy brow-guard (**376**). These represent four or five helmets altogether.

Apart from the uncertain **375** all the fragments come from helmets which Robinson (1975) classified as auxiliary cavalry forms (specifically his types E, F and I). However, these are now seen simply as standard types used by both foot and horse during the third century.

Particularly striking is the precision with which these fragments may be matched to helmets from Europe, notably those from Heddernheim, Amerongen and Kalkar-Hoenepel, not only in their general arrangement but also the fine details of their construction and even in degrees of curvature (see catalogue). This evidence, limited though it is, suggests that the helmets of the Durene garrison at the time of the siege were indistinguishable from those to be seen in contemporary Western forts.

An arming cap

In the fourth century, soldiers wore an arming cap beneath their helmet to provide cushioning against blows and chafing (Ammianus 19.8.8; Wild 1979, 107). It is highly likely that this was already the practice in the third century and earlier. I suggest that the hat of wool and felt found at Dura is such an arming cap (**378**); its form would be wholly suitable for use with the Roman-style helmets described above. If correctly identified, it is apparently a unique discovery of its type.

The 'parade helmet'

If it is indeed correctly identified as a helmet, this extraordinary piece (**377**) is unlike the other finds in that it is not fighting equipment. The main reason for the difficulty in identifying the exact form of the piece is its extremely mangled state, twisted and torn into many fragments, most of which are lost. It was probably being recycled as scrap. The thinness of the metal and the details of the ornate repoussé and inscribed decoration clearly relate it to some of the most elaborate of the so-called cavalry sports or parade helmets. It is perhaps fitting that the closest parallel comes from Syria (Nawa/Tell Oum Hauran Helmet B, see catalogue), so it is possible (but far from certain) that this represents an Eastern variation on a general theme. Whatever the true nature of the piece, it is notable that the decoration of this metal object is again in the mainstream of Roman decorative metalwork of the period, both civil and military.

Helmets and head protection at Dura

The 'Persian' example (**371**) is undoubtedly the most important component of the helmet material recovered from Dura. However, while its significance for later Roman military developments has been explored, since currently it remains unique (there are as yet no other reliably dated and provenanced helmets from the early Sasanian empire), it is hard to draw further conclusions about it in the immediate context of the siege of Dura and its place in the military archaeology of the mid-third century. On the other hand, it is possible to make more observations about the Roman material.

Helmets of the same general types as those used by the imperial Roman armies in Europe were demonstrably worn in the East. A number have been found, representing early imperial legionary types (e.g. Hebron: Robinson 1975, 71, pls 175–8), cavalry pieces (Jerusalem: James 1986b) and 'cavalry sports' types (e.g. Emesa: Robinson 1975, 121, pls 349–51; Nawa/Tell Oum Hauran: Abdul-Hak 1955, both in Syria; Sheikh Ibada, Egypt: Garbsch 1978, 64, helmet O12, pl. 19:3). Another example of a face-mask, probably from Zeugma, is now in the British Museum (Kennedy with Bishop 1998, 135, fig 8.13). The repertoire of types and decoration is essentially the same as that seen in Europe, with some local variations.

The fragments from Dura fit this pattern of similarity to the West. They generally represent second/third-century types very familiar from Europe, with large cheek-pieces and strong crown reinforcements, which are now believed to be the standard helmet forms worn by both Roman infantry and cavalrymen in the middle imperial period. Severan and later military tombstones (see Coulston 1987 for a general discussion) show that even legionaries wore them. The stone of Aurelius Surus of *legio I Adiutrix* in Istanbul (Fig. 24:D; Oldenstein 1976, fig. 14:2; Coulston 1987, pl. 2) shows his helmet on the ground next to him; it has a small neck-guard, large cheek-pieces and the characteristic tall peak of many such helmets (the tombstone of M. Aurelius Avitianus is also comparable: Speidel 1976, pl. 5).

Yet why were so few traces of Roman helmets found at Dura? This scarcity is significant, especially in view of the great quantities of body armour found. However, much of the latter comes from the fortuitous preservation of a small number of complete scale garments, especially in Tower 19, which distort the picture. Helmets may well have been particularly prized as booty by the victorious Persians. Additionally, perhaps iron was becoming more common than copper alloys as the metal used in making them (it was universal in the fourth century; Klumbach 1973; James 1986a), so perhaps we can blame differential corrosion.

A further possibility exists: that the sparsity of helmet remains directly reflects reality, in that helmets really were not worn at all by some of the Roman troops stationed in the city. In the one place where this can be tested, i.e. the Tower 19 countermine, there is no evidence that any trace of helmets was found among the great mass of Roman armour and bodies found there (*Rep*. VI, 188). Copper alloy and iron shield bosses were found in some numbers, as well as mail (Fig. 14; *Rep*. VI, 195). The complete oriental helmet was found nearby (Fig. 13). The conclusion must be that the Roman soldiers were fighting in the mine in body-armour but bareheaded. This may seem strange, as one might expect that in a fight in a cramped, dark mine helmets would be particularly useful given the obvious additional risks of head injuries. It is tempting to wonder whether the soldiers fighting in the mine were not issued with helmets, or chose not to wear them. The design of contemporary Roman helmets did not allow the head to be thrown back very far which would make it impossible to fight in the crouching position which the low mine gallery demanded; they may have been doffed for that reason alone (suggested by M. Bishop, pers. comm.).

However, the possibility remains that some soldiers in the East routinely wore no helmet. In fact, for what they are worth, representations of soldiers fighting bareheaded are to be seen in the synagogue murals (Plate 4). Several of these figures had some kind of headdress which has been interpreted as a medieval-style mail coif (Kraeling 1956, 97; of the published versions, only Tomlin 1989, 240 is sufficiently detailed, but reproduces reconstructions in which the indication of mail texture could be an erroneous inference). No evidence was found for such hoods at Dura (although this could be due to the chances of survival) and I am aware of no material evidence for them from elsewhere in the Roman or indeed the Sasanian world. The only parallel known to me is to be found in one of the illustrations in the fifth-century Vatican Virgil manuscript, which shows figures apparently wearing such mail hoods (Vergilius Vaticanus, fol. 73v; Weitzmann 1977, pl. 4). While Coulston argues for the cumulative value of this evidence as possibly reflecting actual practice (1990, 145), I would regard it as an illustrator's convention of uncertain inspiration, not necessarily reflecting reality at Dura. It may have been taken from Iranian sources; simple draped headcloths are seen on some unidentified, but certainly oriental, figures in the Sasanian reliefs at Bishapur (Fig. 26:B). Likewise, the bare heads of the infantryman may derive from observation of the garrison at Dura, but could also result from adopting the contemporary Persian artistic convention of showing armoured figures without helmets.

It may seem highly illogical that troops should be provided with body armour and shields but be left bare-headed; modern studies of battlefield trauma have highlighted the particular vulnerability of soldiers to head injuries so that for much of the

twentieth century the only armour normally worn by soldiers was a helmet. However, it is clear that the development of Roman armour does not always follow what seems to us be a logical course, and it is evident that fashion and perhaps other factors could override plain practicality. Perhaps metal helmets under the desert sun were considered by at least some infantry men to be more of a health risk than combat. In this connection, it has been observed that in modern situations where there is high risk of head injury, for example on building sites or archaeological excavations, it is often very difficult to get workers to wear helmets even when issued, and when they know the risks; they are often discarded on grounds of sheer discomfort. Given these observations, it may be that the Durene infantry did not normally wear helmets, or that they discarded them in the mine to avoid restricted vision, and because the cramped conditions removed the risk of blows from slashing weapons.

Among the fragments of Roman helmets which do servive from Dura, regional peculiarities of style or form are lacking with the possible exception of helmet **377** (if such it is), with its extraordinary Medusa-head decor. The decorative elements employed are commonly seen on Roman helmets, although wider parallels on a range of artefacts do seem to have an eastern distribution; however, the motif itself is of course classical. Otherwise, as noted above, the fragments are all identical to European pieces.

There is one hint of cross-frontier exchange in the assemblage, but interestingly this is to be found on the 'Persian' helmet **371**: the reinforcing strip down the front of the helmet may well be a Persian copy of similar components on Roman helmets.

Catalogue: Helmets and head protection

371

Complete iron helmet (Figs 47, 48)

Provenance: Tower 19 Countermine
Yale No. 1938.5999.1000*
Dura no. unknown
*Replacing the previous published no. 1981.62.28.

This helmet was briefly described in *Rep*. VI, 194 and fig. 16 (Fig. 13). It has been fully published, and its affinities and significance assessed (James 1986a). The reader is referred to the publication for further discussion and illustrations.

It is quite extensively oxidized, and was crushed when found. At Yale it was extensively rebuilt. The helmet had lain on its right side, the left being shattered when the mine roof caved in (James 1986a, fig. 14). About 80–90% of the original fabric survives.

The helmet is made entirely of iron. The basic bowl is composite, constructed in two half-shells, meeting on the longitudinal axis. Each is independently riveted to an external strip of iron running over the apex from brow to nape. The last few centimetres of this strip are missing at the back, revealing that the two half-bowls abut but do not overlap. The excavators recorded the presence of a second joining strip, on the inside, but no trace of this is now visible thanks to the liberal use of plaster in the restoration of the helmet.

The preserved dimensions of the bowl are: height (rim to apex) 250 mm; length *c*.255 mm; width 160 mm; circumference 660–80 mm. The thickness of the plate is hard to measure in its corroded state but may be estimated at *c*.2 mm, perhaps a little more at the rim. The external strip was of fairly constant width, about 30 mm, and 3–4 mm thick, as was the inner strip, according to the site card preserved at Yale. When found, the helmet weighed a massive 4.15 kg, although the degree of corrosion means that the original weight may well have been considerably different.

As restored, the bowl is distorted due to the lateral compression which shattered the left side and somewhat flattened the right. However, it is clear that it was tall. In profile the bowl is roughly parabolic but in front elevation the sides sweep up to meet the crest strip in a point.

The ridge strip follows the contours of the junction of the two half-bowls in its section, i.e. it is nearly flat at front and back, and V-sectioned over the apex. The rivets holding each half-bowl were carefully paired, at approximately 65 mm intervals. They had pronounced heads, perhaps once hemispherical, but now much distorted by corrosion.

At the apex is fixed a blunt, cylindrical iron projection, apparently solid, rising 51 mm above the bowl. It is attached by two tabs, one running down each side of the ridge and pierced by two rivets, one through the joining-strip and one through the half-bowl. This probably served as an attachment for some kind of crest, of organic material and unknown form. Sasanian helmets, at least later, may have had cloth covers (Simpson 1997, 244–5).

Fixed to the joining strip, running from just in front of the spike down towards the brow, is a partly preserved curved iron plate, standing perpendicular to the helmet. It reaches a maximum preserved depth of 27 mm and was originally up to 5–6 mm thick. Apparently it was not attached to the bowl at the time of discovery, but is correctly restored. Its upper end is a flat, teardrop-shaped terminal, which was pierced by a large rivet holding the plate to the crest strip. How far down the front of the helmet this plate reached is unclear, as the lower part is lost. However, an indentation in the edge of the right half-bowl suggests that the lower fastening rivet was immediately above the brow. There is no indication of a similar plate down the back of the bowl, but the possibility cannot be entirely ruled out.

The forehead region is badly damaged. The post-depositional crushing means that here the two halves now meet almost at right-angles where they should butt edge to edge. Furthermore, the lower front corner of the left half is lost, and with it some important details. Nevertheless, it is possible to reconstruct the appearance of the brow area with some certainty. Overall, the lower rim of the bowl conforms approximately to a horizontal plane. At the front, however, there are two shallow curved cut-outs over the wearer's eyes. Riveted above these cut-outs and conforming to their curvature was a single plate of iron, up to 4 mm thick, forming a pair of 'eyebrows'. The inner half of the left eyebrow was lost with the bowl fragment, and the outer half of the right one is covered by the mass of mail fused to the right forehead region and cannot be seen. However, enough of each is visible for a complete reconstruction to be made. Each extended about 90 mm from the centre-line. The left eyebrow is 11 mm deep at the tip, flaring to 15 mm at its broken end. The right is 23 mm deep, *c*.25 mm from the centre-line. The upper edge of the plate dips steeply in the middle, reinforcing the impression of a pair of eyebrows.

It is clear that the lower edges of the eyebrows swept down into a protective nose-guard, which has been snapped off at the base and lost. While reinforcing the forehead region and serving a secondary decorative function, the main purpose of the eyebrows was the anchoring of this nose-guard. The originally T-shaped plate was attached by four dome-headed rivets, one through each tip and one through the top of each eyebrow *c*.25 mm from the centre-line.

Adhering to the lower edge of the bowl, all along its back and left side, is a mass of oxidized mail. This provided cheek and neck protection in the form of a mail screen, or camail, suspended from the helmet rim. It is much folded upon itself, and a large part adheres to the right forehead region where it was trapped beneath the bowl at deposition. In places it is well enough preserved to show rings of about 9 mm diameter, but it is not possible to establish the thickness of metal or the joining technique without X-rays. It appears that the uppermost row of links were passed through small holes just above the rim of the bowl. This explains the raggedness of the left side of the rim, as the mail was evidently torn away from it when the helmet was crushed. The mail was almost certainly attached all the way around the rim except, of course, across the eye cut-outs.

There is a row of four rivets across the back of the bowl, *c*.15 mm above the rim. They do not relate to the camail. It is probably no coincidence that they correspond to the four rivets on the front of the bowl, which hold on the eyebrow/nasal plate. It is suggested that these eight rivets also fastened the lining, probably of fabric, which would have been essential to prevent this tall helmet falling over the wearer's eyes.

No very close parallels to this helmet are known so far, but it is clearly foreign to the Roman tradition which otherwise prevails at Dura (see **372**–**376**). Other, poorly provenanced but supposedly Sasanian helmets are probably much later in date (Grancsay 1963; Overlaet 1982, etc.). It is significant that the best parallels are the Roman ridge-helmets of the fourth century AD from sites like Intercisa, Berkasovo, Burgh Castle (Klumbach 1973; Johnson 1980, etc.) and Richborough (Lyne 1994). See also an example from a grave at el-Haditha, Jordan (Parker 1994, 391–3, figs 8–9).

372

Iron cheek-piece of a helmet

Provenance: E8-68
Yale number 1938.5999.1001
Dura no. H371
Height 186 mm; width 146 mm; thickness *c*.3–5 mm

This almost complete right cheek-piece was at some stage reassembled from heavily corroded fragments. Intact except along the top edge, it is made of iron plate apparently *c*.3–4 mm thick, although this is partly corrosion layering.

Figure 47 Iron helmet **371**, front and left side.

Figure 48 Iron helmet **371**, drawings and reconstruction. The exact form of the mail attachment is conjectural, based on Sasanian representations.

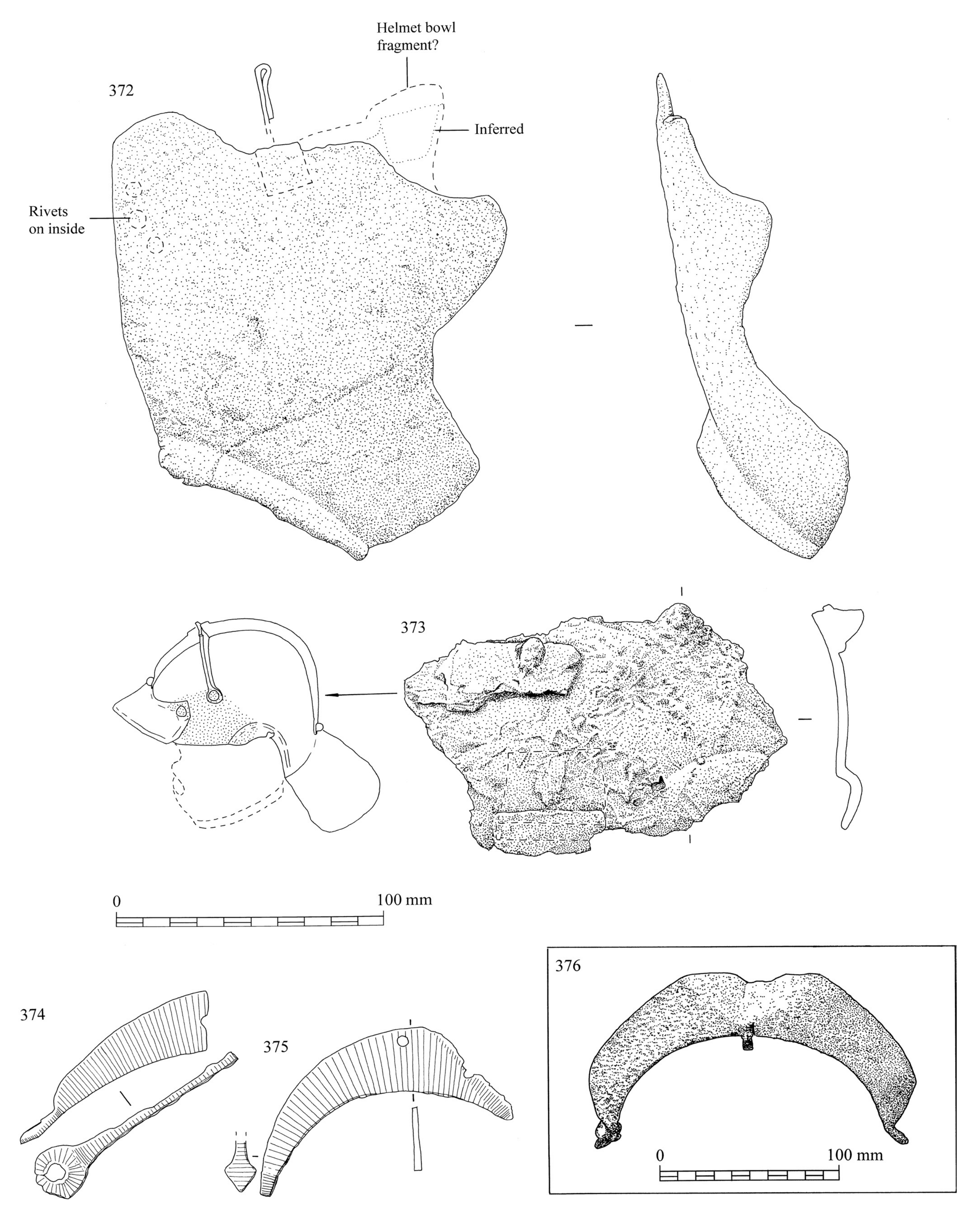


Figure 49 Fragments of helmets of Roman type: iron cheek-piece (**372**) and skull fragment (**373**), and copper alloy reinforcements (**374** to **376**).

The Dura records suggest that when it was discovered rather more of the upper front region survived; this now-missing part is approximately indicated in the drawing.

At the bottom the smoothly curving plate has a narrow flange to protect the throat, 8 mm deep at the front and deepening to 11 mm at the rear. It also has an extension to cover the ear.

An iron tab on the inside upper edge is probably associated with the method of attachment. Probably it is the rear of two tabs, folded inwards over the hinge axle, like that seen on a helmet from Heddernheim (Robinson 1975, pl. 259).

Three rivets on the inner surface (indicated on the drawing) probably attached a lining, and mark the position of the rear edge of the wearer's ear.

This is a typical cheek-piece from Robinson's so-called auxiliary cavalry type E or F (1975 97–9), although it is no longer believed that these were specifically cavalry helmets. The best parallel is the Heddernheim piece, mentioned above.

373
Fragment of an iron helmet
Provenance unknown
Yale no. 1938.5999.1002
Dura no. unknown
Preserved dimensions *c.*120 mm by 90 mm. It is of iron plate now 3–4 mm thick.

Part of an iron helmet, comprising the left temple area of the bowl. It is heavily corroded, with many traces of organic material in the oxidation products. Part of the integral ear-guard, the terminal rivets for attachment of the brow-guard, pieces of the guard itself and transverse reinforcing bars are preserved, as is the hinge for the attachment of the cheek-piece. A fragment of the upper edge of the latter survives *in situ*, showing that it overlapped the edge of the helmet bowl to cover the vulnerable hinge. The design of the latter was not recorded. The external rivets attaching the brow and crest reinforcements were too corroded to ascertain their form (spherical or teardrop-shaped).

This helmet is of a distinctive type and close parallels are available. The precise form of the integral ear-guard corresponds only to those seen on two copper alloy helmets, one from the Rhine at Amerongen and the other from Kalkar-Hoenepel, both supposedly second century AD, both Robinson's 'auxiliary cavalry' type F (Robinson 1975, 98–9, pls 263–8). The identification is further supported by the method used to affix the brow-guard. It is a broad, horizontal peak in form, found on the Kalkar-Hoenepel piece ('type F': Robinson 1975, 98, pls 263–5) and the Heddernheim find ('type E': Robinson 1975, pl. 259). The absence of a decorated band following the lower rim of the bowl, and the form of the ear-guard clinch the identification as 'type F'. Robinson thought that on 'stylistic and finishing' grounds two copper alloy cheek-pieces from Königshofen were from helmets of this form (1975, 92, fig. 120). Significantly, these have a tab on their upper edge identical to that preserved on the Dura fragment. The similarity of **373** to its German parallels in even the finest detail is worthy of note.

374
Fragmentary copper alloy crown reinforcement
Provenance unknown
Yale no. 1938.3301
Dura no. unknown
Length 90 mm+, width 28 mm, thickness 2–3 mm

The characteristic shape of this object, its curvature and its termination in a flat plate pierced by a large rivet hole make identification as a helmet crown reinforcement secure. Such defences are common on middle imperial helmets. The profile of this piece corresponds particularly closely to those on the helmets from Kalkar-Hoenepel and Amerongen (Robinson 1975, pls 263–8), specifically the front portion of the longitudinal defence, which has a flatter profile than helmets of the Heddernheim type (Robinson 1975, pl. 259). Like the Dura example, the reinforcements on the Kalkar-Hoenepel and Amerongen examples have discoid terminals, whereas those on the Heddernheim helmet are pointed.

Where it is snapped off there are traces of a drilled hole through the middle of the bar. This would correspond to the method of making a slot for interlocking the longitudinal and transverse reinforcements seen on other examples from Corbridge and the Saalburg (Robinson 1975, 90, figs 113–16). The slot seems to have been cut from the bottom. This object may have been associated with **375**.

375
Fragment of possible crown reinforcement
Provenance unknown
Yale no. 1938.3300
Dura no. unknown
Length 98 mm+, width 25 mm, thickness 2–3 mm

Superficially this appears to be another reinforcement like **374**, with the same section and similar curvature, but the terminal is very thick and lacks a rivet hole. However, it does have a hole drilled at the point where it was broken off, which would be an interlocking slot cut down from the top. This would correspond to the slot in **374**, perhaps suggesting that they come from the same helmet. But their adjacent accession numbers are no evidence that they were found together, and it is not certain that there is any connection between them beyond their superficial similarity.

The function of the second hole drilled through this piece is as uncertain as that of the rest of the object, whose identification as a helmet fragment must remain tentative in the absence of parallels for its strange unriveted terminal. Perhaps it was unfinished.

376
Copper alloy brow-guard
Provenance: E8-63
National Museum, Damascus
Dura no. H326
Length 177 mm, width 63 mm, thickness 2 mm

Recorded on a site card at Yale, whence the dimensions are taken. Its condition is described as 'corroded, and bent in the middle'.

The site sketches show that this was thought to be a downward-pointing visor like that of a peaked cap. Both upturned and downturned peaks are known on Roman helmets (see **372**). However, the orientation of this one is proved by the angle of the riveted terminals, one of which still contained a hemispherical rivet head. It was originally mounted pointing upwards, riveted to the helmet at each end and prevented from rotating about the rivets by a central tab which penetrated the helmet bowl. The curvature shown on the site sketch does not seem to be reflected in the photograph and is probably exaggerated.

The function of this object, like that of **374** and **375**, was to spread the force of a blow and to prevent the weapon reaching and penetrating the helmet bowl. Unless the damage was post-depositional, this piece was tested in action, as it has a massive central dent. Clearly it did not fold up, so the skull was not damaged.

Judging from the provenance this piece seems to have been found not far from the cheek-piece, **372**. It is possible that they come from the same helmet (copper alloy brow-guards are known on iron helmets; e.g. the Heddernheim example, Robinson 1975, pl. 259), but this is not particularly likely.

Parallels are those on the helmets from Friedburg ('type E': Robinson 1975, 97, pl. 258) and Osterburken ('type I': Robinson 1975, 104, figs 124–6).

377
Fragments possibly from a copper alloy 'parade' or 'cavalry sports' helmet
Provenance unknown
Yale no. 1938.3668
Dura no. unknown

Twenty-two fragments of an object of thin (under 1 mm) copper alloy sheet with repoussé and engraved decoration. Its identification as armour is tentative, and based on the technique of manufacture and the repertoire of decorative elements. The fragments, which are all fairly small, include no features which can make the identification certain; it is quite possible that this is simply a decorative plaque from a vehicle, an item of furniture or a building. There is a plaque from Hatra with a Medusa head, possibly part of a chamfron (horse's face-guard: Fukai 1960, 172, pl. 34), and a Medusa phalera from Carnuntum (*RLÖ* V, 90, fig. 46).

The fragments are twisted and torn, apparently deliberately, perhaps as scrap for recycling. The object cannot be reassembled, but it is evident that not all of it survives.

There are three types of surface decoration: an engraved feather pattern, an embossed and engraved pattern of locks of hair, and an embossed element which resembles a croissant and probably depicts snakes. These components may represent the symbolism of the Aegis of Zeus.The former two styles suggest a relationship with certain Roman 'cavalry sports' or 'officer's parade' helmets, suggesting that this, too, may be some kind of ceremonial helmet.

The hair pattern is very common on the 'sports' helmets,

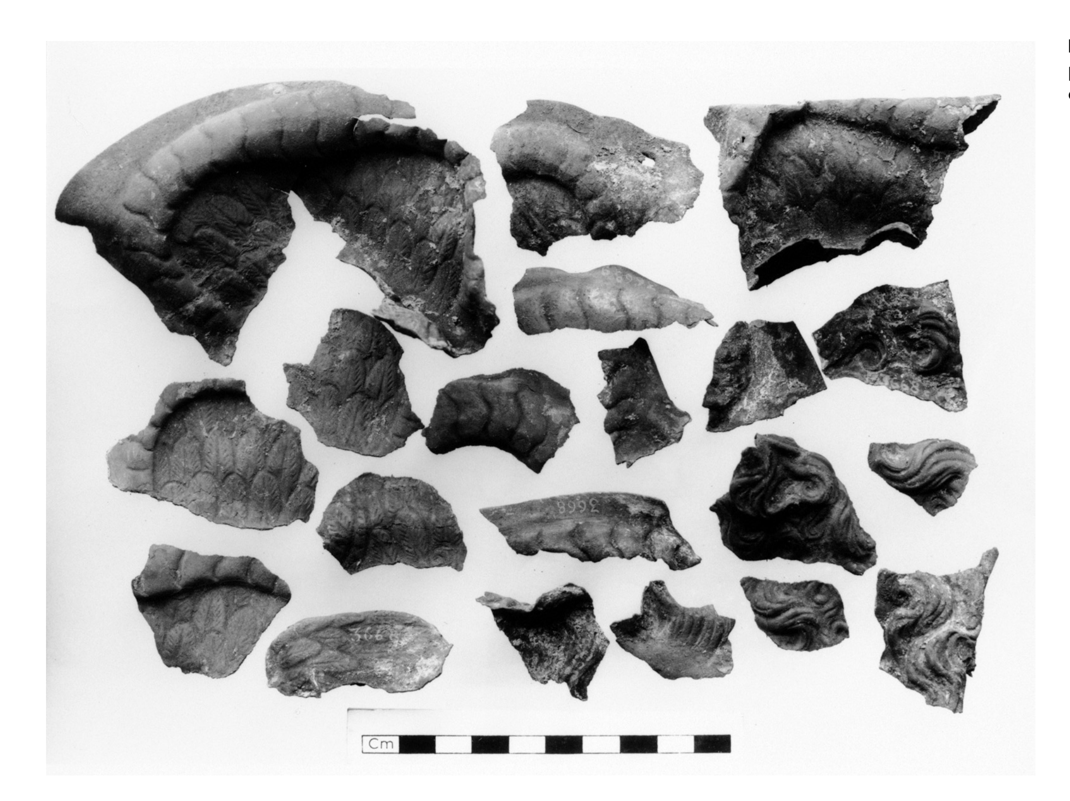


Figure 50 Copper alloy fragments probably from an elaborately decorated helmet (**377**).





Figure 51 Textile hat interpreted as an arming cap for wearing as padding under a helmet (**378**). Note the long cheek-flaps, and felt at the neck which would prevent chafing.

which often depict elaborate coiffures (e.g. Robinson 1975, pls 341–3, 359–66, etc.; Garbsch 1978, pls 1, 2, 14, 19–21, etc.), a tradition already established on some Hellenistic helmets (Künzl 1997, figs 10, 11 and 18). Recently it has been demonstrated that many early imperial helmets actually seem to have been covered with animal hair (Künzl 1999). Less common is the feather pattern, which is seen on an unusual helmet from Ostrov, Romania (Robinson 1975, 134–5, pls 407–10), and another from Pfrondorf (Robinson 1975, 126, pls 367–9). An extraordinary recently-published helmet, from the Axel Guttmann collection and sadly unprovenanced, has a complex crest which, apparently, originally boasted two eagle's heads; the details on this object closely echo a number of features of the Dura find (Born and Junkelmann 1998, No. AG471, pls XXV–XXVII).

Such helmets are found in the East, e.g. Homs, Syria (Robinson 1975, 121, pls 349–51), and a fairly close parallel from Hebron (Weinberg 1979).

The Dura fragments also include what appears to be a half-folded eagle's wing, worked out in the round (Fig. 50, bottom left). Repoussé eagles are well represented on parade helmets. The Pfrondorf example has one in high relief on the upper forehead. Closer to Dura, such eagles are seen on two helmets from Tell Oum Hauran (Robinson 1975, 120,

132). However, the closest parallels are the superb example on the crest of the Theilenhofen parade helmet (Garbsch 1978, pl. 10), and on the front of the metal crest of a helmet from the Iron Gates (Robinson 1975, 128, pls 381–3). The latter piece is also embellished with repoussé crescents, snakes and locks of hair.

If it is a helmet, then, the eagle's wing suggests a Theilenhofen-type metal crest. However, the pieces with the 'croissant/snake' design seem to come from a broad neck-guard, which had several pairs of 'horns' around it with a radial feather pattern as background. There is a remarkably close parallel for almost all features of the design (eagle, hair, and 'croissants', here seen to be snakes) on a fine helmet from Nawa, also known as Tell Oum Hauran (Helmet B: Abdul-Hak 1955, 174–85; Garbsch 1978, 60 Helmet N2, pls 16:2–4). It is interesting that the best parallel of all should also come from Syria.

A very broad neck-guard such as may tentatively be postulated for this piece is not paralleled on any of the helmets discussed above, but something analogous exists on the extraordinary helmet from Autun, a developed Etrusco-Corinthian piece in gilt copper alloy with an elaborate and massive neck-guard worked to resemble laurel wreaths (Robinson 1975, 136, pls 413–16).

378

Arming cap of woollen cloth and felt

Provenance: L8 W104
Yale no. 1938.5673
Dura no. unknown
Published in Pfister and Bellinger 1945, 58, no. 289, fig. 8, pl. XXVIII

It is described in Pfister and Bellinger as follows: 'Cap woven in one piece . . . [parts of edges] and the ends of the ear tabs not preserved . . . Flap between the ear tabs folded inward and sewed. Pile on the ear tabs in loops 2.0 cm. long in rows 1.0–1.4 cm. apart. A felt lining of undyed wool was sewed on with \ / undyed wool thread . . .' It was apparently dyed after weaving. Dark brown.

The shape is consistent with a protective liner for wearing under a helmet. It is quite well padded, with pile added to the cheek-flaps and a felt lining, all of which would also absorb sweat, minimize chafing, and help dissipate the shock of blows. The slightly pointed top was strongly folded over and flattened, again consistent with being worn inside a helmet.

Armour

A remarkable quantity of armour was recovered from the excavations, mostly mail and scale, plus some elements of plate armour and a single laminated piece. There are several thousand individual items, ranging from entire horse armours to fragments of single copper alloy scales. However, the post-excavation history of the material has not helped in its analysis.

In addition to the usual problems of objects becoming disassociated from their original site numbers, assuming they ever had any, many have also lost their Yale accession numbers, or were never assigned them. There also seem to have been at least two attempts, one probably by Wright (1963), to sort and classify the scale armour according to a typology based on the number and arrangement of apertures, with scant regard to seeking the context and likely association of different pieces. Consequently, items which are probably from the same scale garment have been separated because the pattern of holes through the scales is different. Hole-patterns seem often to have varied within a single garment, with, for example, edge-rows often having one large hole to lace on trimming where neighbouring scales may have four for stitching to the backing cloth. Other garments had more than one size of scale (e.g. **489**). Consequently, rigid attempts to establish a typology have probably led to the loss of excavated associations, and now hinder our understanding without producing any meaningful result. They are therefore not used in the present study.

The published references are often of little help in establishing provenances for particular pieces. Armour was found from the start of the Yale/French Academy seasons, but the references are often hopelessly vague (e.g. *Rep*. I, 4, 73). Others do not correspond to anything in the existing archaeological record: for example, scales with 'usually four holes in the upper right-hand corner by which they were sewn to the coat of leather or cloth' are recorded (*Rep*. I, 73), but there is no sign of such scales anywhere in the collection.

It is clear that several pieces of armour were recovered essentially intact. These are mostly well known, comprising the leather cuisses (**441**, **442**), the two armoured horse trappers (**449**, **450**) and two shirts (**379**, **380**). The *Reports* also reveal that complete sets of scales from pieces of armour whose backings had disintegrated were also recovered, especially in Tower 19 (e.g. **451**), but even though some of this material can be tentatively identified at Yale, it is not possible to do much with it as, at the most basic level, we cannot be sure that all that was found is still at Yale. Quantities of armour went to the Higgins, the Royal Ontario Museum and perhaps elsewhere.

The remains are considered by garment type: mail shirts, scale cuirasses, limb defences and horse armour. It should be noted that some of the identifications are tentative due to the fragmentary condition of most of the pieces, and to our limited understanding of the repertoire of garment types and forms to which we are trying to assign the pieces. The substantial quantities of very fragmentary scale defences have been grouped into a miscellaneous section at the end, as they could have been used for a variety of purposes.

Mail shirts

All the surviving mail (armour consisting of interlocking metal rings, so-called 'chain mail') is essentially of iron, often embellished, on the edges and elsewhere, with rows of copper alloy rings. It is assumed here that all the mail fragments come from shirts, as there is no unequivocal evidence for the use of this type of armour for leg, head or horse armour in the Roman world (although see the camail on the 'Persian' helmet **371**), and all the more intact pieces are demonstrably from such garments. It is not possible to estimate how many garments are represented, due to the state of the records. The accompanying catalogue lists more than thirty entries, some of which could be different fragments of a single shirt, while single entries such as **386** could include fragments from more than one.

There is one complete shirt (**380**) and one which is largely complete (**379**). The latter, along with most of the larger and best preserved fragments (**381**–**383**), can be attributed to the group of material from the countermine beneath Tower 19.

Circumstantial evidence, as well as the curious trident device on its front, suggests that **379** is Persian (p. 37). The rest is likely to be mostly or entirely Roman, especially the remainder of the mine material.

All the mail seems to be of standard construction in which each ring passes through four others, two in the row above and two in that below. There is no sign of any other kind of ring armour, *contra Rep*. III, 79. These other types probably never existed in reality, but find their origin in Victorian misinterpretations of depictions of standard mail (for mail construction see Burgess 1953 and Sim 1997). On the other hand there is no trace of such archaeologically attested exotica as mail with scales attached to the rings (see an example from Augsburg: Robinson 1975, 173, pl. 484).

In the absence of X-rays the details of manufacture of the iron mail are obscure. Even the best-preserved fragments are too corroded for us to be certain whether rings were butted (i.e. the ends of the wire forming the ring simply met end to end, without overlapping) or overlapped and riveted, and whether stamped rings were used. Where studied, Roman mail seems to have consisted of riveted and welded rings (Bishop and Coulston 1993, 190), although Sim argues that stamped rings are also to be found (Sim 1997, 360–1). The copper alloy edging rings preserved in some quantities at Dura include both stamped and butted rings (e.g. **385, 398** and **406**). No riveted

copper alloy rings were definitely identified. However, this apparent absence of the use of riveting need not apply to the iron rings, since copper-working techniques differ from those used for iron. The butted copper alloy rings are probably all from edge trimming, where mechanical strength is a low priority and so the weaker technique could be used. It may be that the iron rings which made up the great bulk of the same garments were riveted for superior strength. Some of the better preserved fragments have small spots of copper corrosion in the oxides on the surface of the rings (e.g. **384**) and these could well betray the presence of copper rivets like those used on the mail shirt from Sutton Hoo (sixth–seventh century AD: Bruce-Mitford 1978, 232–9, fig. 181). See also the Roman period mail from Thorsbjerg (Alfs 1941, 78).

A considerable variety of ring size is seen across the fragments. Links of diameters ranging from six to ten millimetres are preserved. Except for the rings apparently stamped from plate, which have a squarish cross-section, the other copper alloy links are of wire of approximately circular section. The iron links are insufficiently well preserved to see their sections.

The use of copper alloy rings on some, but by no means all the mail shirts was at least partly for embellishment, in order to produce a gold-on-silver effect. This is certainly true of the trident device on the 'Persian' shirt (**379**: Figs 54, 55). Copper alloy trimming of collar, cuffs and hem may also have had a practical purpose. These areas were particularly vulnerable to the corrosive sweat of the wearer, so it may be that resistant copper alloy was preferred to iron for these parts. Such 'gold trimming' remained in fashion on both oriental and western armour throughout the medieval period.

Mail with copper alloy edging rows is seen right across the empire, with a number of examples in Europe (Alfs 1941, 78). It is seen most spectacularly in a Roman shirt from Bertoldsheim, Austria, with its 'check' of copper alloy rings (Garbsch 1984; information from M. Bishop). On the other hand, the use of butted links does not appear to have been known in the West. In medieval times and later, the use of the weaker butting technique was regarded as an oriental characteristic (Blair 1958, 20). Whether this also applies to the classical period is a difficult question, when so little well-preserved Roman mail survives in the East (see **379** for parallels) and, outside Dura, no definitely Sasanian mail has yet turned up at all.

Early imperial Roman mail shirts imitated Greek linen cuirasses in shape, with shoulder reinforcements (Bishop and Coulston 1993, 60). Later shirts were simple 'pullovers' without additional shoulder pieces. They were standard in the Roman army by the early second century (e.g. those depicted on the Adamklissi metopes, Robinson 1975, pls 476–9). The same pattern, albeit with long sleeves, was used by the Sasanians (as seen on early Sasanian reliefs, such as Firuzabad: Herrmann 1977, 86–7).

With a single exception, all the mail shirts from Dura seem to have been of the later, simple form. The apparent exception is a probable mail-hook from the shoulder reinforcements of a shirt of early imperial type (**414**).

The only shirt whose overall form is completely recoverable is the 'Persian' shirt (**379**). A simple 'pullover' in form, it had a slit for the neck, and long sleeves reaching to mid-forearm or wrist. The skirt was short, reaching probably to upper thigh level, and had a short split up each side, probably to facilitate riding.

Among the presumably or certainly Roman remains, the complete **380** is too convoluted to restore, while others are too fragmentary to be of much help except for the two sleeves (**381** and **383**); which indicate that both long and short sleeves were in use. The synagogue paintings, some of which may depict contemporary soldiers, depict long sleeves. However, it is not certain whether the garments depicted, which are grey, represent mail rather than iron scale (Plate 4).

The Roman mail shirts at Dura, then, so far as can be established, were all simple 'T-shirts' or 'pullovers', which it is suggested imitated the contemporary military tunic (p. 59) in shape, cut, length of hem, often in length of sleeves and sometimes even in decoration (with bands of contrasting colour at neck and cuffs; **381** may have rows of copper alloy rings imitating the band at the shoulder).

Scale armour

Fragments of scale defences were found in substantial numbers. Copper alloy armour was probably more common than iron, but the picture is distorted by differential corrosion. Much of the armour seems to have been only shallowly buried and even the copper alloy is in a poor state, dramatically illustrated by the survival of a number of twist-fasteners from scale cuirasses which have apparently otherwise completely oxidized away. Iron scale could have been in wider use than copper alloy; however, I think this is unlikely, especially for the finer sizes of scale needed for shirts rather than horse armour. It is noticeable that the smallest surviving iron scales are as big as the larger copper alloy scales, with not much overlap. Iron scales were evidently mainly used for horse armours and other relatively heavy, coarse defences, with copper alloy more common for soldiers' armour.

No sign of decorative or protective tinning has so far been noted on the Dura scales, but this may be due to heavy corrosion and/or drastic cleaning techniques.

There is a relatively limited range of distinct types of scale in use at Dura, although within each type particular examples show a certain amount of variation in size and proportion. It was noted above that there is evidence that some garments contained more than one type of scale, a conclusion confirmed by recent finds from Zeugma (Kennedy with Bishop 1998, fig. 8.21) and Carlisle (McCarthy *et al.* 2001, fig. 3).

Construction of scale armour

Almost all the scale garments, from soldiers' shirts to horse armours, are constructed in similar ways and so can be discussed together. The only exceptions are the leather cuisses, which are described below.

The garments were constructed on a coarse cloth backing (two layers in the case of horse armour) which gave the armour its shape. The fabric appears to have been linen (**448**, **449**).

The scales, which appear always to have been of a single metal and usually of a single size on a given garment, were attached to each other in rows by staples of metal, usually copper alloy wire or strip, which passed through a vertical pair of holes in each lateral edge. The ends of the staple were

bent or hammered over at the back. The rows usually overlapped consistently in one direction; on the horse armour the overlap was arranged so that each scale covered part of its neighbour to the rear, and the top of the row below, to encourage projectiles coming from the front or above to glance off. Where the overlap changes and becomes irregular there are usually reasons for assuming that this marks a rough repair.

The completed rows were then attached to the fabric backing, usually by heavy thread. This was sewn through a group of apertures, either a vertical pair or a square of four holes, in the centre of the top of the scale. Several different methods have been identified. Where there are four holes a cross stitch was used (**449**, **accessory**). Where there is a single pair of holes, two methods could be employed. In the first (seen on cuisses **443** and **444**) two separate threads run along the rows, one passing through the top hole and one through the lower hole of each scale, and crossing over for the next scale. This is presumably designed to keep the scales in place if one of the threads should break. In the second method (seen on scale cuirass **432**), a single thread loops through the upper hole and over the face of the scale to a lower row, and in so doing loops over a second, thicker cord which runs along the outer face of the row. It is likely that this arrangement improved the resilience of the armour, provided some degree of shock protection and also helped to reduce chafing of the fastening threads by minimizing their contact with the scale. Scales were usually carefully prepared to minimize stitching-wear caused by friction against sharp edges; holes seem to have been filed if burred, and upper corners of scales were sometimes cut off. Where there are burrs, they are usually the result of a rough repair using a poorly made scale.

Each row was arranged to overlap the one below by a third to a half the height of the scales, enough to cover the vulnerable stitching.

Edging was also highly standardized. The top edging on shirts, and the top and side edging on horse armour consisted of a strip of leather, folded over the edge and held on by a running lace of rawhide which transfixed the entire thickness of the garment through leather, fabric and metal. There were special additional holes cut in the relevant part of the edge scales to take the lace. Where these were top edge scales, the lace hole might be in addition to the stitching holes, or might replace them entirely.

Bottom edging, definitely attested only for horse armour, was somewhat different. A strip of leather was stitched to the outer face of the cloth backing, running under the rear of the lowest row of scales. It projected downwards somewhat, and was clearly mainly intended to prevent the scales chafing against the horse, particularly its legs. Several fragments of this lower skirting are indented with a serrated pattern, which may perhaps have been used only to edge neck defences, as the leather points would chafe (e.g. **450 accessory**, **452**). The edgings of the intact horse armours are not serrated.

There are many variants on this basic picture, some more common than others. Minor variants include scales with two side-staples instead of one (**468–473**), and scales attached to the backing with rawhide instead of thread on horse armour **451**.

A more important variant is garments with scales stapled at top and bottom as well as laterally (**453–467**), superficially resembling lamellar armour, especially in those examples constructed from particularly elongated scales. This type of armour is well known (Bishop and Coulston 1993, 117, fig. 77:3). Unlike other scale armour, flexible because individual scales were only joined together along discrete horizontal rows, it is a semi-rigid defence where all the scales are joined by wire, even between rows. A relatively late innovation, it first appears in a dated context amongst the troops operating north of the Danube in the Antonine period – notably from Mušov in Slovakia (Tejral 1990, fig. 1:A). The scales are longer and thinner than normal, and such armour perhaps constitutes an attempt to tackle the main weakness of scale garments: their vulnerability to an upward thrust under the scale rows. Whilst this type offered a stronger defence, it was considerably less flexible than simple scale armour, and there were also greater difficulties in attaching it to a fabric backing. Some show no means of doing so, and probably lacked an integral liner. Others have widely looped staples, which may have been a means of improving flexibility, but may also have been intended for some kind of lacing or stitching to fabric (e.g. **454** and **459**). It is noteworthy that this type, especially with long, thin scales, is suitable for making tubular shapes (e.g. breastplates and perhaps upper limb defences), because it is more flexible in one dimension than the other.

Scale cuirasses

Despite the wealth of material, the Dura evidence still does not allow us to reconstruct a complete scale shirt in order to see how Roman armourers overcame the problems of taking scale rows around the arms and over the shoulders. It cannot even be determined whether Durene scale shirts were sleeved. This is the sort of detail which might have been recovered had the objects been properly recorded and not simply collected up and bagged; the standards exhibited on the broadly contemporary Sutton Hoo excavations suggest that this is not entirely unreasonable hindsight. We are left with tantalizing but unfathomable clues like **508**, an unusual item which may come from some kind of shoulder piece or limb defence.

The details of manufacture match evidence from elsewhere in the empire, notably the fragment of Severan date from Carpow in Scotland (Wild 1981; Coulston 1999). The top edge (neck aperture?) of the piece is bound in leather strip with rawhide stitching, using the same technique as that universally employed at Dura. The method of attaching the scales and the details of the scales themselves are also virtually indistinguishable from Dura examples (e.g. scale cuirass **432**).

Of particular interest are the numbers of fragments of copper alloy scale shirts with pairs of chest-plates which, where well enough preserved to show detail, are embellished with figural decoration (**415–418**). The solid plates may have offered better protection than their thinness and elaboration imply; indeed the repoussé work would add rigidity to the thin plate. Such plates provided a good solution to the problem of making a neck aperture that would be big enough to allow the shirt to be pulled over the head, but which could then be closed tightly around the neck. The plates overlapped over the sternum and were locked together, usually by twist-keys (**420** etc.), fixed to one plate and passing through rectangular apertures in the

overlapping plate. When rotated 90 degrees, the keys locked the plates firmly together. The squarish key head had a central hole for a cotter pin which, passing through both keys, stopped them working undone. A variant used metal twist-rings (**418**).

Often thought to be cavalry armour, these plates are now regarded as standard equipment, probably for both infantry and cavalry during the second and third centuries. Examples have been found with legionary inscriptions (Bishop and Coulston 1993, 117). In Europe such plates occur with the long, vertically stapled, lamellar-like scales (at Hrusica, Slovenia: Garbsch 1978, 79, no. P18, pl. 35:2), and also with mail (Garbsch 1984). The few well-preserved Dura examples are associated with simple square scales, but the sample is very small.

Limb defences

Separate defences for arms and legs, especially greaves, are well attested in the Roman archaeological record. Dura has produced a fragmentary copper alloy greave of standard Roman form, and what is almost certainly a linen liner for another (**447** and **448**). These were probably cavalry arms at this period.

Cavalrymen's cuisses (thigh-protectors) are not often found in the Roman empire or, more likely, are not identified because they were often made of the same scales as other defences; they need to be largely complete to be recognized by their shape and attachments.

Newstead has yielded a laminated armour limb defence of copper alloy (Curle 1911, 156, pl. XXIII), initially identified as a cuisse (Robinson 1975, 185, pls 503–4), but now reinterpreted as an arm-guard (Bishop and Coulston 1993, 87). Important new remains of iron arm-guards have recently been found at Carlisle (Zant 2001; McCarthy *et al*. 2001), but await study. A fragmentary iron defence of very similar form was found at Dura, the only piece of this type of armour from the site (**446**). It is thought to be either part of a cuisse or a hand-protector due to its relatively gentle curvature. Given that laminated limb defences were known in Asia long before the time of the Dura siege (e.g. at Aï Khanoum, Afghanistan: Bernard *et al.* 1980, 60–3, pl. XXXVIa; Colledge 1977, pl. 27a, fig. 40), and apparently long after (*Notitia Dignitatum Orientalis* 11.2; *Occidentalis* 9.2), and even seem to be depicted at Dura itself (Fig. 23), I suspect that such armour was well represented at Dura, probably used by both sides, but little has been preserved due to the chances of deposition.

The two remarkable cuisses of leather from Tower 19 (**441** and **442**) are well known, but have been misunderstood because the published photographs show only the backs of the garments. This has misled commentators, as the mass of lacing and the apparently upward overlap of the rows of leather scales make these pieces look very unlike other Roman armour, and more like traditional oriental lamellar armour. Their construction from organic materials, and the reliance on lacing rather than fabric backing, supports their general definition as lamellar armour. However, seen from the front, far from overlapping upwards as lamellae usually do, the individual scales overlap downwards with the lower ends free, producing an appearance far more akin to Roman scale than to oriental lamellar armour.

The proposed identification of some garments of conventional scale construction as cuisses (**443–445**) raises the likelihood that thigh defences were much more commonly worn than is usually thought; scale fragments are usually assumed to belong to shirts. The suggested identifications here were only possible because substantial parts of the garments have survived, showing elements of their shape and construction – a circumstance which generally does not prevail in Europe, where loose scales or rows are the rule.

Protective garments beneath armour

It is almost certain that soldiers wore some kind of padded garment beneath their body-armour, to prevent chafing and to help absorb and dissipate the energy of blows which, even if they did not penetrate the metal, could still cause severe injury. The textile backing integral to scale garments would have afforded some protection, but probably not enough. Such padding would have been even more essential beneath unbacked mail. The anonymous author of the *De rebus bellicis*, an amateur military theoretician writing in the later fourth century, described the virtues of such a garment, which he claims had formerly been used;

> The ancients, among the many things which . . . they devised for use in war, prescribed also the *thoracomachus* to counteract the weight and friction of armour . . . This type of garment is made of thick sheep's wool felt to the measure . . . of the upper part of the human frame . . . (Anonymus, *De rebus bellicis*, 15.1–2; transl. Ireland (with amendments), in Hassall and Ireland 1979, 32–3).

The term *thoracomachus* was probably coined by the author himself (Wild 1979, 105). Dura has produced a thick linen greave liner (**448**) and a probable arming cap of felt (**378**), while fibrous material consistent with a padded felt 'arming doublet' is still to be seen inside the 'Persian' shirt (**379**). It is likely that such garments were universally worn but were rarely mentioned or depicted. One which probably does appear in texts is the *sudarium/sudarion*, apparently a neckerchief used to absorb sweat, which would also prevent armour chafing at the neck. The term appears in a graffito listing clothing at Dura (p. 64).

Horse armour

Dura is still, to date, the only Roman military site to have produced unequivocal remains of full armour for horses, of the type used by the super-heavy cavalry of the Parthian, Persian and later Roman empires, although leather from Vindolanda may represent trappers (van Driel-Murray 1993, 50–1, L1289, fig. 22).

Horse armour had a long history before the siege of Dura, and the literary evidence was surveyed by Frank Brown (*Rep*. VI, 444–9). For a recent treatment of the extensive literature on the heavy cavalry who used such armour, and who were known as cataphracts or *clibanarii*, see Coulston 1986, 62–6, and especially Mielczarek 1993, who argues that the difference between these categories of heavy cavalry may have been more to do with tactics than equipment, and that armour may also have been worn by other types of Roman cavalry.

The site has also produced depictions of armoured horses, notably the famous '*clibanarius*' graffito (Fig. 23; *Rep*. IV, 216 no. 7, pl. XXII:2) and a 'cataphract' (Fig. 117:F; *Rep*. IV, 215, no. 6, pl. XXI:3), which are tantalizing but hard to interpret. It is, for instance, quite uncertain whether Roman, Partho-Sasanian or Syro-Mesopotamian (e.g. Palmyrene) soldiers are depicted.

At least three horse armours were found in Tower 19, where they had apparently been in store. The two intact pieces (**449** and **450**) were both unserviceable when found, lacking laces and other elements. Trapper III (**451**) had completely disintegrated into rows of scales, as the backing had perished, and was beyond reconstruction. Yale holds a fragment of a fourth set, probably from a horse's neck defence, which cannot have been from Tower 19 as it has a Yale accession date of 1929 (**452**); its exact provenance is unknown, but this fragment and the loose iron scales also possibly from trappers (e.g. **474–482**), suggest that the Tower 19 pieces were far from being alone at Dura.

The two intact trappers (**449** and **450**) each consist of a pair of large panels of double-thickness linen to which scale rows were sewn. The panels were connected to each other by a wide strip of leather running along the horse's spine, with a hole for the saddle. The purpose of the strip may have been to prevent chafing of the spine, but it is interesting that it was apparently not deemed necessary to carry armour over this area.

It is noteworthy that the detailed shapes of the horse armours differ considerably, the iron example (**450**) offering more enveloping protection than the copper alloy trapper (**449**).

It must be assumed that the trappers were just one element of a more complex suit of horse armour, which also protected the neck and head of the mount. The ties close to the front edge of **449** are only easily explicable in terms of attachment points for a neck defence which substantially overlapped the leading edge of the trapper. The report claims that both trappers were found with a quantity of fragmentary scale defences and loose scales which were interpreted as remains of such accessories. The supposed accessory with trapper III (**451**) was made of scales differing from those of its allegedly associated trapper, and is here identified as a pair of cuisses or thigh guards (**443** and **444**); however, some of the fragments are indeed most probably from neck defences, especially those with serrated leather edging. These are hard to reconcile in form with cuisses, but on the other hand the serrations are likely to have chafed the horses' legs if they were attached to trappers. The most likely explanation seems to be that they are edgings from neck defences. There was no evidence for such exotica as leg protectors for horses, and it seems highly unlikely that any were used, even if they were a practical possibility.

No chamfrons were recovered from the site, but this is assumed to be due to chance, as the horse armours make little sense without them. Leather and plate examples are known from the Roman world, both incorporating 'tea-strainer' eye protectors (Garbsch 1978, 85–8). These were also used in the East (Tell Oum Hauran: Garbsch 1978, 61, no. N5). It is possible that at Dura chamfrons were made of metal scales on linen like the rest of the horse armour.

Certain details of trapper **449** defied explanation at the time of discovery – for example, the two strong plaited loops at the rear edge of the saddle hole, thought perhaps to be suspension points for quiver and sword (*Rep*. VI, 449). Recent work on the Roman saddle (Connolly 1987; Connolly and van Driel-Murray 1991), which is now seen to be basically the same as the Partho-Sasanian saddle (Herrmann 1989), leads to a much more plausible explanation for these loops. It is now known that saddles had four pommels, two jutting out laterally from the front of the saddle over the rider's thighs and the other pair rising either side of his buttocks. It is suggested that the loops on the armour were hooked over the rear saddle-pommels. The purpose was presumably to link the saddle, and its harness, to the armour, which perhaps tended to ride backwards over the horse's rump when on the move.

It is noteworthy that the very large iron scales from the site seem to be largely confined to horse armour, although it is possible that some may have been used for soldiers' armour, at least for cuisses if **445** is correctly identified from its characteristic shape. It may be that iron scales were of limited use for soldiers' armour because smaller sizes were needed for flexibility, especially for infantry equipment, and these were not so easy to make in iron; perhaps easily worked copper alloy was considered adequate for most scale armour. It seems probable that the large iron scales found elsewhere are from horse armour (e.g. from Carnuntum: *RLÖ* II, pl. XV, nos 12–14 etc.).

Armour at Dura

As with helmets, Dura has provided some invaluable evidence for the kinds of armour used in the early Sasanian world (**379**). However, the great bulk of the evidence surely or probably relates to the defeated.

The testimony from Dura for Roman armour for the middle imperial period is arguably the richest body of data ever found in the empire (for a general discussion of the wider representational, literary and archaeological evidence for armour in the third century and later, see Coulston 1990). However, answers to some of the key questions, especially about the form of scale shirts around the shoulders, still elude us.

The overall pattern of types of armour in use is beyond recovery. Iron armour, of mail, scale or plates, is certainly under-represented relative to copper alloy armour due to differential corrosion. But how widely was leather armour used? It is possible that it was as widely employed as armour of copper alloy, at least at Dura, as it would not have survived outside rare microenvironments like the collapsed floors of Tower 19. Common use of organic materials for armour in Roman service is not a generally accepted idea, but it seems to me quite possible that it was a very widespread practice, especially in the later period; pseudo-scale garments like the Dura cuisses would probably be indistinguishable from metal scale in depictions. In Europe evidence for such armour can only be expected in waterlogged contexts, of which there appear to be few appropriate examples of third century or later date. It may also be worth checking existing collections to see whether individual leather scales lurk there unrecognized.

True lamellar armour, distinguished by upward overlapping laced plates, is actually absent from the Dura assemblage. The leather cuisses seem to be an adaptation of a lamellar technique intended to resemble scale armour; the scales fastened at top and bottom are a common Roman type bearing a superficial resemblance to lamellar armour. The picture at Dura may include some very limited Eastern influence on armour, but generally the material belongs to the mainstream of contemporary Roman practice.

The only piece of laminated armour found was a limb defence (**446**). One small buckle, possibly but by no means

certainly belonging to so-called *lorica segmentata* was also found (**61**). While segmented armour may have been commonly used for cavalryman's limb defences, it seems fairly clear that *body* armour of this form was not used much, if at all, at Dura in the third century, even though it is attested elsewhere at the time; fragments of Newstead-type *lorica segmentata* were found in contexts at Eining, which seem to show that this type of armour remained in use down to the mid-third century in Europe (Coulston 1990, 147; Bishop and Coulston 1993, 145). Such armour certainly had been worn east of the Hellespont; there is proof of this from Pergamum (Conze 1912, 327, fig. 122). However, it may never have been very common. There also remains the caveat that recognizable parts of the all-iron later variants might well not have survived in the soil conditions at Dura.

Mail, on the other hand, was clearly very important in Roman employ, and by the third century AD was also used in the Partho-Sasanian world, specifically for body armour. Helmet **371** shows that it was also attached to oriental helmets by this period. However, there is no evidence of its use for separate leg defences, or on horse armour. In the latter case, perhaps the adequacy of armour types less labour-intensive to manufacture, such as scale, rendered it redundant.

With regard to the assembly of individual soldier's panoplies from these various techniques and garment categories, there is little clear evidence regarding combinations. The long mail shirts with sleeves and the scale shirts, of less certain form, served well for infantrymen or cavalrymen. Separate limb defences were probably for horsemen only. Mounted troops had less need for mobility of the lower limbs, but great need for defences for the vulnerable thigh (especially if fighting shieldless with the long lance).

How standardized was the equipment of a particular body of troops? It is noteworthy that no scale armour was found with the bodies in the Tower 19 countermine; the soldiers of the squad trapped there were all clad in mail (unless some were unarmoured, or clad in organic materials). It is likely that this small squad was drawn from a single unit, and it may be postulated that the entire unit was uniformly mail-clad, but this is beyond proof.

Both mail and scale garments show traces of damage and often ham-fisted repairs (although there may be many repairs too good to be easily detectable). With so many individual components, scale armour in particular must have been in constant need of repair, so it is perhaps not surprising to find damaged pieces of horse armour, lacking tie-laces etc., in Tower 19 where they are presumed to have been awaiting attention (*Rep*. VI, 439).

A curious detail of the fragmentary trapper **451** is its piercing by an iron catapult bolt-head (unidentified: *Rep*. VI, 439). It does not seem possible that this could have occurred while the armour was already in the tower.

Artillery is usually assumed to be Roman, and the armour, from its context, was clearly in Roman ownership at the time of deposition. The explanation may simply be that a nervous sentry had shot at a friendly patrol; such accidents are common in war. However, it does raise other interesting possibilities, including the use of captured artillery by the Persians (as is very probable: see p. 16), or that the trapper was booty. Since both sides used armoured horses, it is feasible that the trapper was captured from the Persians or their allies. If so, this would mean that the Sasanians were using armour effectively indistinguishable from that of the Roman defenders (which is largely the case for mail: see **379**). In fact, there is as yet no clear evidence that the Sasanians themselves used scale armour; the famous rock carvings show mail. However, it seems that the Parthians had indeed used scale, including scale trappers (Tang-i Sarvak: Colledge 1977, pl. 20a), and it is quite feasible that Persian auxiliary contingents from cities in Mesopotamia and elsewhere also used it.

Finally, there is the question of the general comparability of the assemblage with those of contemporary Roman Europe. In armour design and practice, Dura was fully abreast of wider contemporary Roman trends. Indeed, with the apparent importance of cavalry armour, it may well have been in the forefront of change, as it is probable that many of the developments leading to the heavy cavalry forces of the late empire would have first occurred on the Eastern frontier in just this period.

Catalogue: Armour

Mail

379
Iron mail shirt
Provenance: Tower 19 countermine
Yale no. 1934.463 (part of)
Dura no. unknown

This mail shirt was found on the body of the so-called Persian warrior in the Tower 19 countermine (Fig. 52; *Rep.* VI, 192–4, 204, fig. 16, pl. XVIII:3).

It consists of rings *c.*8 mm in diameter and *c.*1 mm thick (exact measurements could not be obtained because of the advanced state of oxidation of the iron). In the absence of X-rays it is not possible to establish which technique of mail construction was employed, i.e. butted or riveted rings, with or without intermediate rows of stamped rings.

The front of the shirt is partly destroyed by post-depositional processes including, apparently, collapse of the mine roof. It was folded and rucked up at the moment of deposition. The wearer had perhaps feebly attempted to pull it off before dying (*Rep.* VI, 192) or, equally probably, an assailant may have lifted it to deliver a *coup de grâce*. The folds on the back may suggest he had been dragged by the feet as well. In consequence its exact form is now difficult to ascertain. These problems are exacerbated by the extensive modern materials, mainly wood and plaster, currently supporting the object. Most of the skeleton was apparently removed on site.

Nevertheless it is clear that the shirt was of the simple 'pullover' pattern, and probably reached to the top of the thighs. The well-preserved back, now largely flat from lying on the ground under its own weight, survives to a maximum length of 520 mm, but allowing for the several creases caused by it having partly ridden up, its original length will have been 600–700 mm (Fig. 53).

Its sleeves, damaged and rucked up, nevertheless certainly reached below the elbow, and may well have been wrist length. The right sleeve has suffered much since excavation, with the distal part, including the elbow, now entirely lost. The proximal section still contains part of the right humerus.

The lower rear edge of the shirt is easily traced, even where it is doubled over, as it is trimmed with three rows of copper alloy rings, readily distinguishable by colour. This trimming shows that the skirt had a 105 mm split up each side. The function of this was, presumably, to allow the wearer to sit astride a horse without pulling the armour up, and may suggest that the shirt was a fairly close fit. Such slits existed on Roman mail shirts (Bishop and Coulston 1993, 85), although in the context of Dura in general, and the mine complex in particular, it should be noted how closely it reflects the cut and decor of the Parthian kaftan, which also had side-splits, long sleeves, and trimming along lower edges and at neck and cuffs (Schmidt-Colinet *et al.* 2000, fig. 34).

The neck aperture appears to have been a simple slit in the mail, and was also trimmed with three rows of copper alloy rings. On the upper chest, just below the neck in the matrix of iron rings is a pattern of copper alloy rings in the shape of a trident (Figs 54, 55). A single horizontal row, 80 to 90 mm long, forms the base of three verticals, each *c.*50 mm high and consisting of three rows of rings. The central vertical extends downwards to make the shaft, and was probably also 50 mm long but the end is covered by a fold in the mail. This device, unparalleled on Roman mail, is similar to the 'heraldic' devices seen on depictions of early Sasanian warriors' armour (most notably at Firuzabad, on a helmet and horse trapper; see James 1986a, fig. 11; Ghirshman 1962), and is evidence for the Persian identity of the wearer.

Inside, the shirt contains an unidentified light brown fibrous material, not a woven fabric, which is original and not part of the conservation treatment as it is fused into the oxides. It is suggested that it constitutes the remains of a padded felt 'arming doublet' (p. 113).

Because of its relative vulnerability to corrosion, ancient mail is found much more rarely than scale armour. Nevertheless, a good number of Roman examples are known (the best general discussion is Robinson 1975, 164–73). Riveted mail was found at Newstead (Curle 1911, 161, pl. XXXVIII, fig. 10). Third-century mail of iron and copper alloy rings was recovered at Caerleon (Nash-Williams 1932, 68, fig. 16). Some was of riveted copper alloy rings, 9 mm in diameter (Nash-Williams 1932, 94, fig. 41:4). Similar mail has recently been published from the Hague (Waasdorp 1989, 161, fig. 2). More riveted rings are known from Zugmantel (*ORL* B8, 99, no. 8, fig. 15). Mainz has also produced riveted mail, of second-century date (Rose 1906, 6, fig. 12). A copper alloy-trimmed, knee and elbow-length mail shirt, probably of Roman manufacture, was found at Vimose, Denmark (Engelhardt 1869, 12, pl. 4). See also the find from Grosskrotzenburg, Germany (Klee 1989, fig. 106).

Recently a remarkable mail shirt of Roman manufacture was found at Bertoldsheim, Austria (Garbsch 1984; Bishop and Coulston 1993, 145). Besides having an upper chest plate depicting Mars, the iron mail itself contained a check pattern consisting of double rows of copper alloy rings, showing that decorative patterns in mail were not unknown in the Western empire.

From the Eastern empire, mail of supposedly Roman date was found at Deir el-Medineh in Egypt. It is not clear whether this was a coif or a sleeve (Toronto Museum; Kelly 1934, 206, fig. 1). A mail shirt from Hatra, recently on display in Mosul, might well prove an important parallel, but is sadly unpublished (D. Nicolle, pers. comm.). A mail shirt probably of early second-century date was found with the Hebron hoard, but details are scanty (Weinberg 1979, 85, pl. 25:7).

380
Iron mail shirt
Provenance unknown
Yale no. 1930.595
Dura no. unknown
Published in *Rep.* III, 79, pl. XI:1

A complete mail shirt. It has been dropped and has collapsed and folded upon itself as a result of its weight and pliability. The upshot is an irregular mass of heavily oxidized iron, about 370 by 300 by 40 mm in size. The ring rows are largely distinguishable. The rings appear to be about 8–9 mm across and 1 mm thick. There are no signs of copper alloy edging rings.

381
Sleeve and other fragments from iron mail shirt(s)
Provenance: Tower 19 countermine (?)
Yale no. 1934.463 (part of)*
Dura no. unknown
* These and **382–384** were boxed together, and from their similar condition probably share a provenance, most likely the Tower 19 countermine.

The sleeve is heavily oxidized but appears to be complete. The sleeve opening and the junction with the body shirt seem to be intact. The junction at the shoulder seems to have consisted of three rows of copper alloy rings. The sleeve itself reached only midway down the upper arm. The junction is *c.*400 mm in circumference, and the opening is an oval *c.*100 by *c.*150 mm as preserved. The fact that it is open shows that it was still on a body when deposited, which maintained its shape as it corroded, a process no doubt hastened by the decomposition of the corpse.

The size of the rings is hard to measure due to the state of the piece, though the slightly better

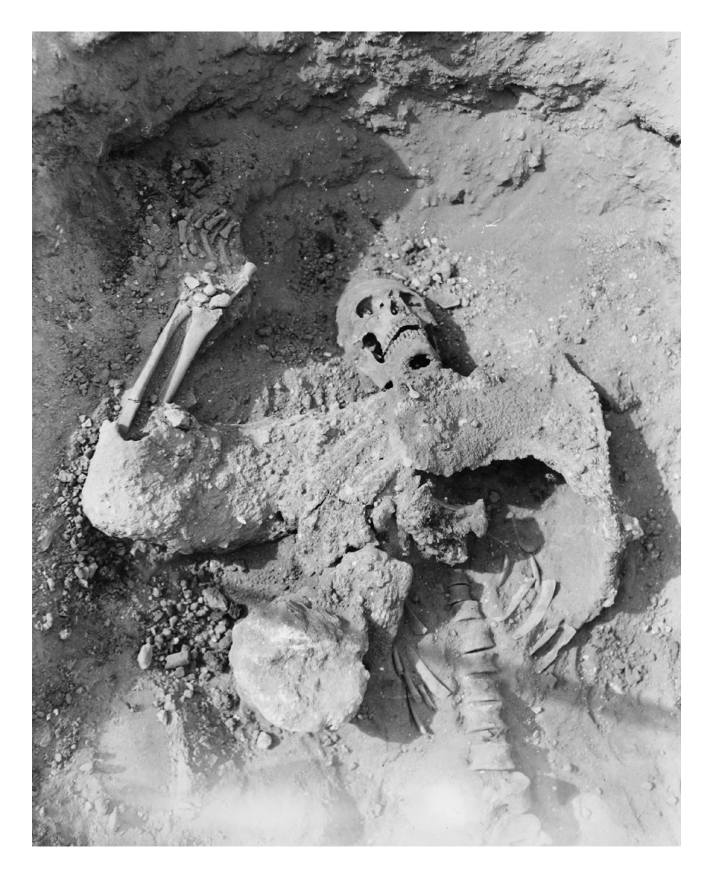


Figure 52 The 'Persian' skeleton in the Tower 19 countermine, wearing iron mail shirt **379**. Note also the neck-pendant.



Figure 53 Iron mail shirt **379** today, back view.



Figure 54 Iron mail shirt **379**: detail of trident device in copper alloy rings below the neck aperture. The lower end of the device is obscured by a fold in the mail.

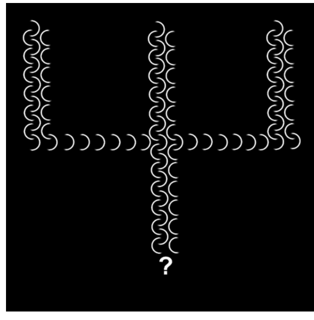


Figure 55 Schematic reconstruction of trident device on mail shirt **379**.



Figure 56 Iron mail shirt **380**.



Figure 57 Iron mail **381**.

preserved copper alloy rings suggest a diameter of *c.*10 mm.

The other fragments of mail in the group, other than **382–384** (which have a wholly different surface appearance) are not informative, but their state of preservation suggests that they come from the same garment as the sleeve.

382

Fragment of iron mail shirt
Provenance: Tower 19 countermine (?)
Yale no. 1938.5999.1003
Dura no. unknown

From the same group as **381**. Extensively oxidized, but the clean state of the surface, with almost every ring visible, indicates corrosion in an air space consistent with a provenance among the bodies in the Tower 19 countermine (*Rep.* VI, 188–205). Further evidence comes from the items adhering to its outer surface. These include a dome-headed rivet, 13 mm across, probably from a shield, and an iron finger-ring, with remains of finger bones fused to the surface. The whole shows extensive traces of burning, all of which is consistent with a provenance in the mine.

It is a fairly creased fragment of the chest or back of a mail shirt, and now survives to maximum dimensions of *c.*300 by 200 mm. Part of what appears to be the lower edge of the garment is preserved. It was not edged in copper alloy rings. The ring size could not be measured accurately but was *c.*7–10 mm. An interesting detail is a botched repair, with a ring in an anomalous orientation presumably intended to bridge a small tear.

383

Sleeve of an iron mail shirt
Provenance: Tower 19 countermine (?)
Yale no. 1934.463 (part of)
Dura no. unknown

From the same group as **381** and **382**, this is also almost certainly from the mine at Tower 19. Its surface condition indicates that it oxidized in an air pocket. It contains the bones of the arm of the wearer, and adhering to its surface are two objects. The first is a fragment of the bowl of a copper alloy shield boss (*c.*60 by 30 mm). The second is part of the blade of a *spatha*, **518**. This piece, too, is therefore very probably part of the mass of remains from the mine described in *Rep.* VI, 188–205.

The preserved length of the sleeve is *c.*320 mm, with a maximum width of *c.*150 mm and maximum thickness of *c.*100 mm. The shaft of the humerus within projects from one end, and the broken ends of the radius and ulna from the other. The angle between the bones shows that the arm was flexed at about ninety degrees at deposition. The position of fragments now adhering to it, apparently from the body of the shirt, suggest that it is the right arm.

The sleeve appears to have been stretched to almost its full length at deposition. From the position of the elbow joint it seems to have reached about halfway down the forearm, and may not have reached the wrist.

The distal end of the sleeve is well preserved, and is *c.*280–320 mm in circumference. The rings of the last row are seen to be *c.*8–9 mm in diameter. Local

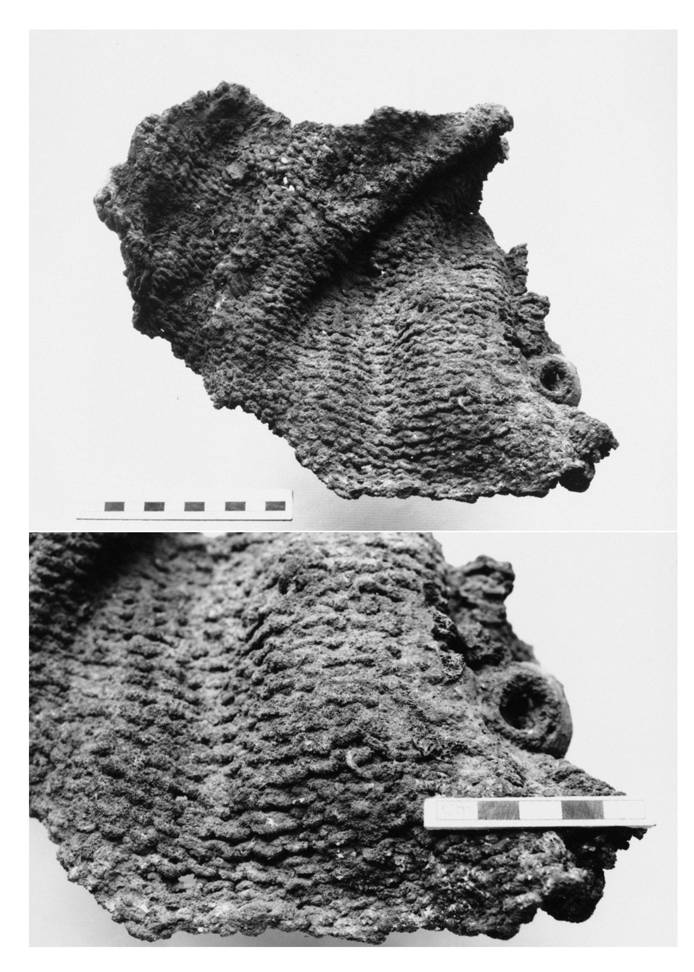


Figure 58 Iron mail **382**, with attached finger rings and remains of finger bones (lower right); and detail of crude repair (below).



Figure 59 Iron mail sleeve **383**, shoulder to left, wrist to right with adhering fragment of a copper alloy shield boss (top centre), and sword blade **518** (running diagonally across left side).

thickening of the rings may suggest riveting.

384

Fragments of an iron mail shirt
Provenance unknown
Yale no. 1938.5999.1138
Dura no. unknown

Four fragments of iron mail, well preserved in form although heavily oxidized. It appears that these corroded in an air pocket, so the shape and surface form have not been obscured by adhesion of soil particles. The rings are particularly clear, 8 mm in diameter, many with traces of copper corrosion products perhaps from copper rivets.

One tiny fragment of about six rings supports this: it is an edge, with the last row bound to only two other rings each. These three bottom rings are 10 mm across, and about 1–1.25 mm thick. The rings of the second row have the same dimensions, but each ring has a copper stain presumably from a rivet. The absence of these stains from the edge rings might suggest alternative rows of riveted and stamped or welded rings.



Figure 60 Iron mail **384**.



Figure 61 Iron mail **385**.

385

Fragments of an iron mail shirt
Provenance: E8-80
Yale no. 1938.5956
Dura no. H403
The site card at Yale preserves the following notes: 'Mail corselet found w[ith] skeleton. Found in folded + crumpled mass of frag[ment]s. Partly iron, partly bronze mail. Whole rusted together . . .'

Most fragments are now amorphous chunks of oxide, but some preserve the ring structure, especially the fragment edged with copper alloy rings in apparently four rows. These rings were 7–8 mm across, and a little over 1 mm thick, made of copper alloy wire of circular section. They were apparently all butted, though of course this weak construction need not have applied to the iron rings.

386

Fragments of iron mail shirt (not illustrated)
Provenance: 'G3-H5'
Yale no. 1930.595c (?)*
Dura no. J171 (?)*
* One fragment bears the number quoted, which is the same as that of **380**, but the latter is certainly complete, so these fragments must come from a different shirt or shirts. In fact the Dura no. and Yale no. are mutually contradictory, implying that the item was accessioned at Yale some years before it was excavated! Clearly one or both are wrong.

Four fragments of iron mail, with traces of copper alloy edging rings.

The rings are about 9 mm across, but details of their thickness and construction are obscured by corrosion.

387
Fragment of iron mail (not illustrated)
Provenance unknown
Yale no. 1938.5999.1004
Dura no. unknown

388
Fragment of iron mail (not illustrated)
Provenance unknown
Yale no. 1938.5999.1005
Dura no. unknown

389
Fragment of iron mail (not illustrated)
Provenance unknown
Yale no. 1938.5999.1139
Dura no. unknown

390
Fragment of iron mail shirt (not illustrated)
Provenance: 'G5.7 D31'
Yale no. 1935.557
Dura no. unknown

Folded mail fragment, 220 mm across, of iron rings 8–9 mm in diameter. There are traces of rows of copper alloy rings, and a textile impression in the corrosion products.

391
Fragment of iron mail (not illustrated)
Provenance: Tower 19 countermine (?)
Yale no. 1933.714
Dura no. F1329

A fragment of oxidized iron mail which was deposited in an air pocket. This, combined with its discovery in the sixth season, indicates that it came from the Tower 19 mine complex. The rings were *c.* 9 mm in diameter. No copper alloy rings were visible.

392
Copper alloy edging from iron mail (not illustrated)
Provenance: L7-W2
Yale no. 1938.5999.1140
Dura no. G1977

393
Fragment of iron mail (not illustrated)
Provenance unknown
Royal Ontario Museum no. 933.25.22 (old no. G5732)*
Dura no. unknown
* Royal Ontario Museum, originally from Yale, but cannot be linked back to the Yale records.

A small fragment, 47 mm across, heavily corroded, of 8 mm diameter rings.

394
Fragment of iron mail (not illustrated)
Provenance unknown
Royal Ontario Museum no. 933.25.23 (old no. G5733)*
Dura no. unknown
* Royal Ontario Museum, originally from Yale, but cannot be linked back to the Yale records.

A fragment, 54 mm across, probably from the same garment as **393**.

395
Fragment of iron mail (not illustrated)
Provenance unknown
Royal Ontario Museum no. 933.25.24 (old no. G5734)*
Dura no. unknown
* Royal Ontario Museum, originally from Yale, but cannot be linked back to the Yale records.

Completely oxidized; 65 mm across. Possibly from the same garment as **393**.

396
Fragment of iron mail (not illustrated)
Provenance unknown
Royal Ontario Museum no. 933.25.25 (old no. G5735)*
Dura no. unknown
* Royal Ontario Museum, originally from Yale, but cannot be linked back to the Yale records.

A fragment, 35 mm across, of oxidized mail with rings about 8 mm across.

397
Fragment of iron mail (not illustrated)
Provenance unknown
Royal Ontario Museum no. 933.25.26 (old no. G5736)*
Dura no. unknown
* Royal Ontario Museum, originally from Yale, but cannot be linked back to the Yale records.

A double thickness of mail, with a fold down one edge. Now entirely corroded. Rings about 9 mm in diameter. Fragment 35 mm across.

398
Copper alloy edging from iron mail (not illustrated)
Provenance: Tower 19
Yale no. 1938.3727
Dura no. unknown

A few butted rings of copper alloy wire, 7.5 mm in diameter. A fragment of an iron ring adheres to one, confirming the identification.

Isolated rows of copper alloy trimming rings from iron mail which has completely corroded away are known from a variety of sites, e.g. Caerleon (Nash-Williams 1932, 94 and fig. 41, no. 4), Theilenhofen (*ORL* B71a, 13, no. 6, pl. IV:41) and Carnuntum (*RLÖ* XXXI, pl. 18). See also Alfs 1941, 78, for a piece from the Danube.

399
Copper alloy edging from iron mail (not illustrated)
Provenance unknown
Yale no. 1938.3728
Dura no. unknown

Apparently four rows of copper alloy rings, 7.25 mm in diameter and 1.25 mm thick, with traces of the first row of iron rings still adhering.

400
Copper alloy edging from iron mail (not illustrated)
Provenance unknown
Yale no. 1938.3729
Dura no. unknown

Apparently four rows of butted rings *c.* 6 mm across, 0.6 mm thick. Traces of iron rings adhering to them.

401
Copper alloy edging from iron mail (not illustrated)
Provenance unknown
Yale no. 1938.3730
Dura no. unknown

Three rows of copper alloy rings, with fragments of iron rings adhering to them.

402
Copper alloy edging from iron mail (not illustrated)
Provenance unknown
Yale no. 1938.3731
Dura no. unknown

Three rows of copper alloy rings, with iron fragments adhering to them.

403
Copper alloy edging from iron mail (not illustrated)
Provenance unknown
Yale no. 1938.3732
Dura no. unknown

Three rows of copper alloy rings, 8 mm in diameter, 1.2 mm thick.

404
Copper alloy edging from iron mail (not illustrated)
Provenance: L7-W
Yale no. 1938.3658
Dura no. F1155

Five links of copper alloy wire, all butted. Four are 8 mm in diameter and 1.5 mm thick. The fifth is 7 by 1 mm.

405
Copper alloy edging from iron mail (not illustrated)
Provenance: M8-W2
Yale no. 1938.3653
Dura no. F777

Too corroded to measure rings.

406
Copper alloy edging from iron mail (not illustrated)
Provenance: L7-W23
Yale no. 1938.3654
Dura no. F1541

Two types of copper alloy ring, butted ones 8.5 mm across and 1.5 mm thick, and stamped links 7.5 mm across and 1 mm thick. Some fragmentary iron rings survive.

407
Copper alloy edging from iron mail (not illustrated)
Provenance unknown
Yale no. 1938.3656
Dura no. I406
Published in *Rep.* IX.iii, 63.

There are two types of ring, butted (diameter 8 mm, thickness 1.3 mm) and stamped (6–7 by 0.5–1 mm). Five rows survive.

408
Copper alloy edging from iron mail (not illustrated)
Provenance: M8
Yale no. 1932.1516a
Dura no. E1043

A similar piece of edging to **398–407**, with iron rings adhering to them.

409
Copper alloy edging from iron mail (not illustrated)
Provenance: B3-30
Yale no. 1938.3655
Dura no. G1664 (?)

410
Copper alloy edging from iron mail (not illustrated)
Provenance: L7-W
Yale no. 1938.3660
Dura no. F1155

411
Copper alloy edging from iron mail (not illustrated)
Provenance: J7-W1
Yale no. 1938.5999.1141
Dura no. G1786

412

Fragment of iron mail (not illustrated)

Provenance: J3/5, Temple of Bel
Location unknown
Dura no. K424

From Yale records. No further details.

413

Fragment of iron mail (not illustrated)

Provenance: G5-D1
Location unknown
Dura no. unknown

A file card at Yale records a 'large piece [of] chain mail, very badly rusted, several thicknesses together; with it, 15 fragg [ments].' This may well refer to items catalogued under separate headings, but identifications are impossible.

414

Copper alloy, probable hook fastener from a mail shirt

Provenance: J7-W1
Location unknown
Dura no. G1744
Length 64 mm+, thickness 1.5–2 mm (from drawing)

Known from a site sketch on a card at Yale bearing a sketch labelled 'full scale'. The form is characteristic of one half of the double hook which fastened the shoulder panels to the chest on mail shirts of late republican and early imperial pattern. The type is absent from Antonine sites, and so seems to have gone out of use by the reign of Hadrian (Bishop and Coulston 1993, 86, 117, fig. 48).

Scale armour

Scale cuirasses

415

Fragment of a copper alloy scale cuirass

Provenance: L8-W104
Yale no. 1935.31
Dura no. G25
Published by Klumbach 1962, 193, no. 28; Garbsch 1978, 79, no. 19

Described as 'Br[onze] plaque repoussé', this is the upper right chest plate of a scale cuirass once thought to be for so-called cavalry sports, but now seen as a standard element of second- and third-century armour (Bishop and Coulston 1993, 117). It is a badly corroded copper alloy plate, 118 mm high, 88 mm wide and under 1 mm thick. Yale possesses a drawing and photographs.

The design is a standard Minerva head beneath a bird resting with wings folded (an eagle or goose: Borhy 1994), all within a cabled border. It has two rectangular apertures for twist-key fastenings, 18 by 6 mm. Two of the original four attachment rivets survive on the other edge. From the front these pass through the plate, then one or two scales (now fragmentary), then 4 mm of textile and a copper alloy washer or load-spreader which stops the rivet pulling through the cloth. The point of the rivet was hammered over.

This piece is well within the range of variation shown by several near-identical pieces from European sites such as Frankfurt (Garbsch 1978, 77, pl. 36:3), Pfünz (Garbsch, 1978, 79, pl. 36:6), Hrusica (Garbsch 1978, 79, pl. 35:2), Buciumi (Chirila *et al.* 1972, pls LXXXIV–LXXXV; Petculescu 1990, 845, fig. 3:4) and other Dacian sites; Oltenia, Micia and from Porolissim where the parallel has rectangular apertures for twist-fasteners (Petculescu 1990, 845, fig. 3:nos 6, 7 and 3 respectively).

A similar plate, showing Minerva full face, has turned up at the temple site at Masjid-i Solaiman in Iran, surely a piece of booty from the Roman frontier (Ghirshman 1971, 174, pl. IIIa).

416

Fragments of a copper alloy scale cuirass

Provenance: M8-W10, Temple of Zeus Kyrios
Yale no. 1938.5999.1006
Dura no. H109

A badly corroded chest plate from a scale cuirass, shattered and beyond restoration, with some loose scales. The Yale records preserve a site card with a sketch which shows that when found this was in one piece; it formed the upper part of the left chest plate, and had a cabled border surrounding a bird, in repoussé work. This should presumably be identified with a find mentioned in *Rep.* VII/VIII, 305: 'part of a lorica squamata, with fragments of powdery cloth still adhering to the scales, and a small fragment of a shoulder piece with a goose design', discovered among debris incorporated into the anti-siege rampart. The site card also records that the top of a helmet crest, surely of a bust of Minerva, was visible on the broken lower edge.

Only part survives, with some attached scales. The plate was attached to the scale shirt by rivets with heads decorated with concentric circles. These pierced a layer of leather, the scales and fabric backing, and were hammered over a diamond-shaped washer, 14 by 21 mm. **432** may be part of the same garment.

The scales are fine, about 0.5 mm thick, and nearly square, *c.*13 by 13 mm, with rounded lower corners. They are linked by copper alloy staples about two-thirds of the way down the sides, and are attached to the cloth backing by a centrally placed vertical pair on the central axis near the top edge of each scale, using 1 mm thick thread. Very similar scales are to be seen on the Buciumi example (Chirila *et al.* 1972, 69 pl. LXVIII:2).

417

Plate probably from a copper alloy scale cuirass

Provenance: H2*
National Museum, Damascus
Dura no. K600
*The record card at Yale says 'Temple of Atargatis, cistern'.

A rectangular plaque, 84 mm high, 62 mm wide and 0.5 mm thick, of copper alloy repoussé work. It is clearly closely related to **415**, again depicting Minerva in the same style, facing right. This differs from the standard cuirass plates in being rectangular, with a rivet hole at each corner. It is closely paralleled by a piece from Brigetio (Garbsch 1978, 78, pl. 36:2).

418

Plate probably from a copper alloy scale cuirass

Provenance: J3 St B
National Museum, Damascus
Dura no. H536

A copper alloy repoussé plaque, almost certainly the left chest plate from a scale cuirass. When found it was 127 mm tall, 79 mm wide and about 1 mm thick, but heavily corroded. Before it was photographed, the upper part was lost. However, earlier sketches and the existing pictures show that its decoration was apparently borderless, and consisted of a male figure in tunic, breeches, cloak and probably knee-boots, facing left, with his left arm resting on his hip or perhaps sword-hilt, and possibly a banner or spear over his right shoulder. The figure is not easy to identify, but could be Mithras or perhaps one of his acolytes, Cautes or Cautopates. No close parallel is forthcoming, although there may be a connection with the figure on shield **618**, thought possibly to depict the god Iarhibol.

The fastenings also differ from the standard type. Down the right-hand edge there are some small holes, a pair near the bottom corner and a group of three about 50 mm above, perhaps designed to allow the plate to be stapled directly onto a scale shirt. See similar examples from Adana, Turkey (Garbsch 1978, no. P3, pl. 34:3), Manching (Garbsch 1978, no. D1, pl. 8:1) and Pfünz (Garbsch 1978, no. P23, pl. 9:13).

On the left edge is a ring of metal wire, which probably served to fasten this plate to its neighbour. This may have worked quite simply, if the ring was attached by a split pin which allowed it to be raised from the surface and swivelled into the vertical plane, allowing it to pass through an upright slot in the opposite plate. It could then be twisted back through ninety degrees and allowed to drop to the position seen in the left illustration, locking the two together. No close parallel is known to me, although there are two chest plates with naked male warrior figures, presumably representing Mars, in Budapest (Borhy 1990).

419

Fragments of a copper alloy scale cuirass

Provenance: X7-5
Yale no. 1938.4110 (part of)
Dura no. I741

A fragment of a copper alloy breastplate and some scales, all very corroded. The scales, 28 mm by 16 mm, have a pair of holes at the bottom as well as the top and sides. Now recognized as belonging to the same garment as **461**.

The breastplate fragment preserves a rivet and square load-spreader, which show that, unusually, the cloth and scales overlapped the front of the piece.

420

Twist-fastener from a copper alloy scale cuirass

Provenance: N8 W Dump
Yale no. 1938.2502
Dura no. K240
Length 30 mm

This and the following similar objects are fasteners from copper alloy scale cuirass plates like **415**.

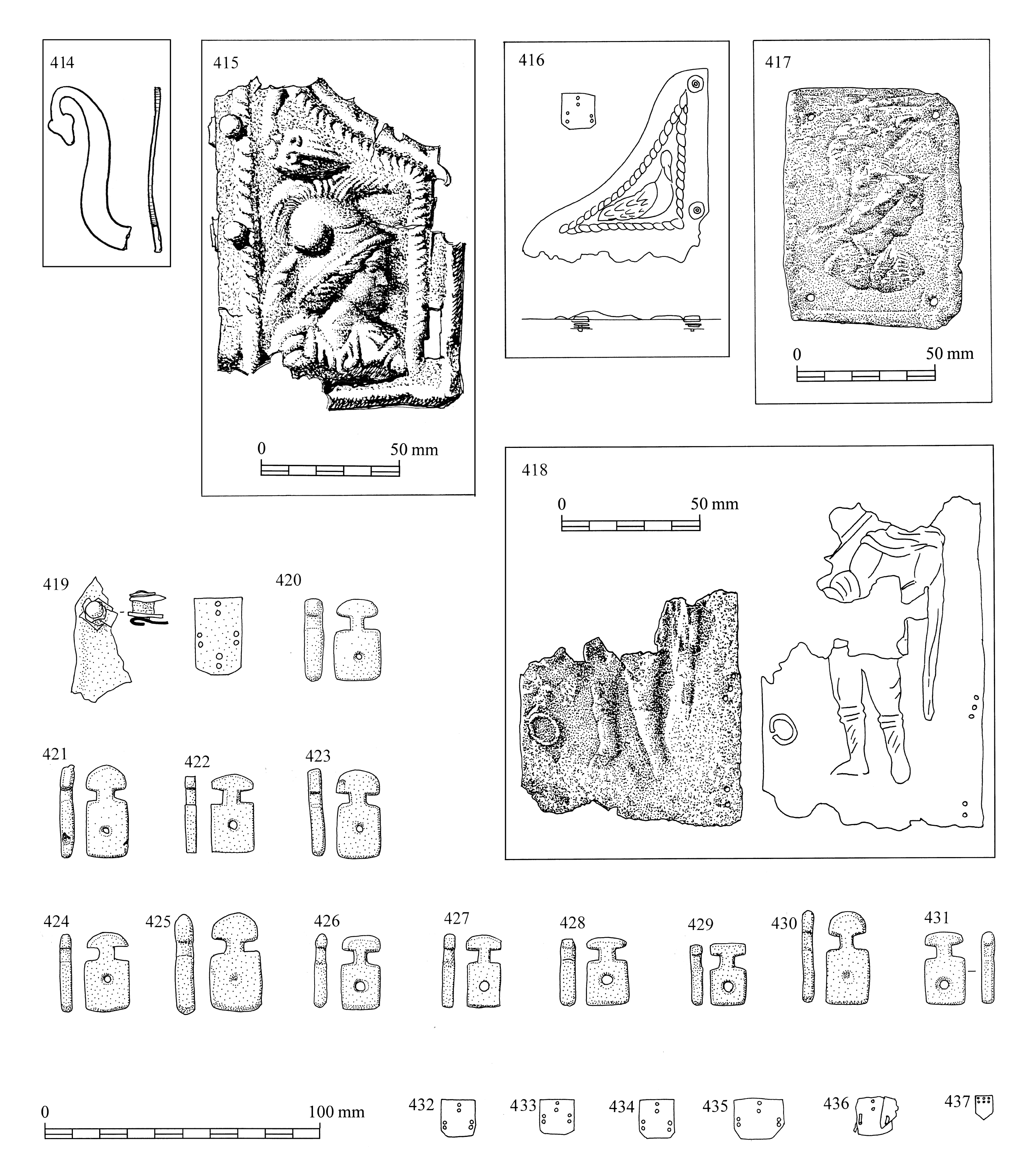


Figure 62 Copper alloy body armour: mail hook(?) **414**, chest-plates **415** to **419**, twist-fasteners **420** to **431**, and scale armour **432** to **437**.

They are identified by the existence of two examples which are still attached to a pair of plates at Manching in Bavaria (Robinson 1975, 161, pl. 454; Klumbach 1962, 187–93; Garbsch 1978, nos D1–2 pl. 8:1).These fasteners, which could swivel in the plate to which they were attached, could be turned to pass through rectangular apertures in the neighbouring plate, like those on **415**. They could then be twisted to lock the plates together, and a pin inserted through the central hole in each fastener would stop them opening accidentally.

These thick copper alloy castings are much more resistant to corrosion than the thin scales and plates of the rest of the garment. Each of them probably represents all that is left of an entire scale shirt.

421

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1938.2499
Dura no. unknown
Length 33 mm

422

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1938.3332
Dura no. unknown
Length 29 mm

423

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1938.2497
Dura no. unknown
Length 32 mm

424

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1932.1606
Dura no. unknown
Length 29 mm

425

Twist-fastener from a copper alloy scale cuirass
Provenance: L7 W10
Yale no. 1938.2489
Dura no. F1538
Length 36 mm

426

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1932.1607
Dura no. unknown
Length 27 mm

427

Twist-fastener from a copper alloy scale cuirass
Provenance: G3 W1
Yale no. 1938.2501
Dura no. K181
Length 26 mm

428

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1932.1608
Dura no. unknown
Length 24 mm

429

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1938.2500
Dura no. unknown
Length 23 mm

430

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1938.3514
Dura no. unknown
Length 34 mm

431

Twist-fastener from a copper alloy scale cuirass
Provenance unknown
Yale no. 1932.1605
Dura no. unknown
Length 26 mm

432

Fragments of a copper alloy scale cuirass
Provenance: M8-W10
Yale no. 1938.4134
Dura no. H108

A quantity of scales identical to those seen on **416**, whose adjacent Dura number and shared provenance may indicate that they are indeed from the same cuirass. There are also very fragile and powdery fragments of backing fabric. Further constructional details are provided by these pieces. The scales are slightly domed at the bottom for additional strength. There was also a 1.5 mm thick cord running across the face of the scale rows, through the loops of thread holding the scales to the backing. On the probable purpose of this, beyond general strengthening, see p. 112. Essentially the same structure is seen on the fragment of scale armour recovered from Carpow (Wild 1981; Coulston 1999).

433

Fragment of copper alloy scale cuirass
Provenance: G1-36
Yale no. 1932.1403 (part of)
Dura no. E565

Some rows and loose scales of the same type as those seen on **416**. There are also fragments of backing fabric. A sketch on the Yale record card shows exactly the same method of attachment as **432**.

434

Fragment of a copper alloy scale cuirass
Provenance unknown
Yale no. 1938.5999.1007
Dura no. unknown

A heavily corroded fragment of a cuirass of scales exactly like **416**.

435

Copper alloy scales
Provenance unknown
Yale no. 1938.4137 (part of)
Dura no. unknown

A few scales of the same type as **416**, although slightly wider.

436

Copper alloy scales
Provenance unknown
Yale no. 1938.5999.1008
Dura no. unknown

A few scales of the same type as **416**.



Figure 63 Copper alloy scale body armour **438**.

437

Fragments of very fine copper alloy scale armour
Provenance unknown
Yale no. 1934.467b
Dura no. unknown

A small quantity of loose scales, 6–7 mm high by 5–6 mm wide, and only about 0.25 mm thick. They have pointed ends, and are held on by six holes, in three vertical pairs or two rows of three, at the top.

Virtually identical scale armour is known from Carnuntum (*RLÖ* XXXI, pl. 18) and Vindobona (*RLÖ* XXIII, pl.XXXV:1). Scales of the same form, but slightly larger, are known from Great Chesters (Allason-Jones 1996, 193, no. 37, fig. 10).

438

Fragments of a very fine copper alloy scale shirt
Provenance unknown
Yale no. 1934.464
Dura no. unknown

Substantial portions of a garment of extremely fine scales identical in size and shape to **437**, now heavily oxidized and fused together.

Despite their tiny size, the scales were linked by the conventional wire staples, and presumably the rows were affixed to the backing with thread via the central pair of holes in each scale. However, the piece is now too corroded to show this detail.

One of the fragments preserves the backing fabric and traces of an upper edge. Above the top row of scales is a row of holes for the leather edging strip.

The intricacy of the work was highly skilled and enormously labour-intensive. It must have been very expensive, and was probably therefore a rather showy shirt. Its strength and effectiveness in battle may be doubted. Certainly, it would have been troublesome to repair damage.

439

Fragment of a very fine copper alloy scale shirt
Provenance unknown
Yale no. 1938.5999.1142
Dura no. unknown

A fragment, *c.*200 by 70 mm, of a garment of identical construction to that of **438**, and possibly part of it. It is folded double, inside out. The flexibility of such fine armour is well seen in this piece, which took a 180 degree fold with a diameter of about 20 mm. See **438** for parallels.

440

Fragments of very fine copper alloy scale armour (not illustrated)
Provenance: J1-103
Yale no. 1938.4135
Dura no. K502

A small quantity of loose scales, identical to **437**.

Limb-armour

441

Leather 'lamellar' cuisse
Provenance: Tower 19
Yale No. 1938.5999.1009
Dura No. unknown.
Published in *Rep.* VI, 450, no. 1, pl. XXIII, left; and Robinson 1975, 162, pl. 457



Figure 64 Copper alloy scale body armour **439**.



Figure 65 Leather cuisse **441**, front view.

Found with a second cuisse or thigh defence (**442**) between the collapsed floors of Tower 19. The identification of these as thigh guards is based on their size and shape and seems secure. Both had provision for laces to hold them around the thigh of the wearer, and they are of the appropriate size to cover the wearer from the waist to below the knee. Such defences are appropriate to cavalrymen, affording protection to the vulnerable exposed area between body armour and greaves (if worn).

The two are mirror images in shape, but it is not easy to decide which was right and which left; however, they do not constitute a pair, as they differ in size, colour and construction. To add to the confusion, examination of the pieces reveals that both publications have got them back to front; the published photographs show the rear side only. The front of each has a dramatically different appearance with almost all of the complex lacing hidden and the lamellae overlapping downwards, not upwards as published.

On balance I think that this piece is for the right leg, in which case the exposed edge of the overlapping scales would be downwards and backwards when mounted on horseback, affording maximum protection from a downward blow.

Lamellar armour differs from scale in structure in that the small plates of which it consists are not dependent on attachment to a cloth backing, but are attached directly to each other. Usually the complex lacing is visible on the front of lamellar defences, and the individual plates usually overlap upwards, again in contrast to the practice with scale armour. The Dura pieces are unusual in both these respects, for the lacing is almost entirely covered by the scales, which overlap downwards. In addition, most of the components are not fixed at the lower end, like most scale armour, and again unlike true lamellar armour. Consequently, these defences are not true lamellar defences but a hybrid form, with a strong superficial resemblance to Roman scale armour. This is especially intriguing, as if this armour were common across the empire, it would be almost undetectable. Its organic construction would militate against its survival in the archaeological record, while in any representation its construction would make it almost indistinguishable from scale armour.

441 is 740 mm long and 570 mm wide, and is made of thirteen rows of rectangular 'lamellae' 65–70 by 40–5 mm, plus an extra row of larger scales (80–90 mm by 40–50 mm) at the bottom. Below this is a single extra-large scale, 90 by 60 mm, which probably formed a basic shin-guard. The scales vary in thickness from 3 to 5 mm. The defence is clearly more or less complete, as most of its leather edging survives.

The original report describes the scales as *cuir bouilli*, which involves soaking in water or, better, hot wax in order to harden the hide (Blair 1958, 19). Robinson, who, so far as I can establish, never inspected them, says they are rawhide. The scales do not have the texture or appearance of rawhide, which was widely used for stitching scale armour at Dura.

Robinson also described the piece as lacquered red. No trace of this was seen by me, although the vertical lacing and leather edging is reddish.

The 'lamellae' are connected in horizontal rows by a leather lace, squarish in section, about 3 mm thick, which runs along the front of the rows (Fig. 67, left). It passes through three holes on either side of the upper part of the scale. Some of the rows have a second lace midway down (see below). The rows are linked vertically by red leather strips, about 7–10 mm wide and 1–2 mm thick, running down the back of the garment. Each strip passes to the front of a 'lamella' through a small rectangular slot, loops around the horizontal lace and passes back through the aperture and moves on to the next row. Unlike the scales, which have the skin side outwards, the laces have the smooth surface inwards, probably to reduce chafing.

The bottom row has a different transverse lacing system. The longer scales are joined at both top and bottom, like more conventional lamellar armour, but the lace passes through only two holes on each side. The vertical laces attach the row to the rest by the same method of looping through the scale and over the upper lace; however, in this row there is a second slot below the first on each component. The vertical laces pass once more to the front through these, and each is secured by a knot. The upper ends of the vertical lacing strips pass over the upper edge of the topmost row of scales, where they are caught by the lacing of the edge-strip. About 200 mm of each lace was left to hang over the front of the defence.

The scale rows overlap vertically so that about 35–40 mm of the scale below is exposed. It is noticeable that all the primary structural lacing is covered, as in ordinary scale garments and unlike other lamellar armour.

The cuisse is edged with red leather strip, in two lengths, around all but the straight vertical edge. This trimming, 20–30 mm wide and 1.5 mm thick, is held on by lacing. The untrimmed straight edge seems to have had a different arrangement, consisting of a 10 mm by 1 mm leather lace running down the back, squeezed through a pair of 3 mm round holes in the edge of each terminal scale.



Figure 66 Leather cuisse **442**, front and rear view.

On its outer face the edge of the garment has a continuous line of holes for fine stitching, presumably for thread, but this is now lost. The purpose of this is obscure. It is possible that the front of the garment was covered with fine cloth to reflect the heat of the sun and protect the leather.

There are signs of repair. Part of the edging is held on by string rather than leather lacing, presumably a secondary feature. Also, certain 'lamellae' have redundant holes, possibly indicating the reuse of parts from other pieces of armour to repair damage.

The only evidence for the method of attachment to the leg is a leather lace, 1 mm thick and 6 mm wide, expanding to 10 mm at its free end, attached to the second scale in from the curved edge, on the twelfth row. Secured by a simple knot at the front, it passes through the scale and *c.*150 mm hangs free at the back. The square-cut end does not appear to be broken. Perhaps it was designed to tie with another around the back of the leg, but no evidence of a matching lace appears at the other end of the row.

It does seem that this piece was fairly old when deposited, and incomplete, most notably in the general absence of fastening laces, according well with the idea that this and other items in Tower 19 at the time of the siege were there in store or awaiting repair (*Rep.* VI, 439).

There are no close parallels for this piece known to me outside Dura. Examples of ancient leather lamellae from unidentified garments were recovered from various Asian sites by Sir Aurel Stein, although these seem mostly to belong to the eighth or ninth centuries AD (e.g., the Tibetan fort of Miran: Stein 1921, 459, MI.0068–71; 481, MI ix 002–004; 482, MI xiv 0074; 483, xxiv 0040).

True lamellar armour is not thought to have been widespread in the Roman world, although metal examples are known from northern Britain (Robinson 1975, 162, fig. 174). It seems to have been much more popular in the East during the classical period. There are depictions of such armour at Palmyra, for example (Robinson 1975, pl. 456).

Below is a summary of the structure (rows numbered from top to bottom):

Row	No. of scales
1	16
2	17
3	17
4	16
5	16
6	16
7	15
8	15*
9	13
10	13*
11	12
12	12*
13	10
Extra row	11*
Shin-guard	1

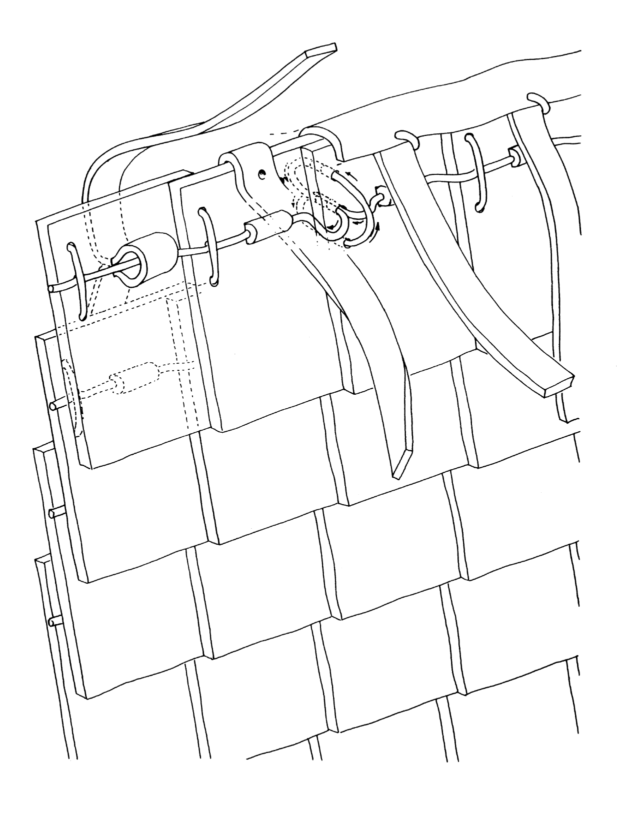
*These rows each have a second transverse lace linking them together.

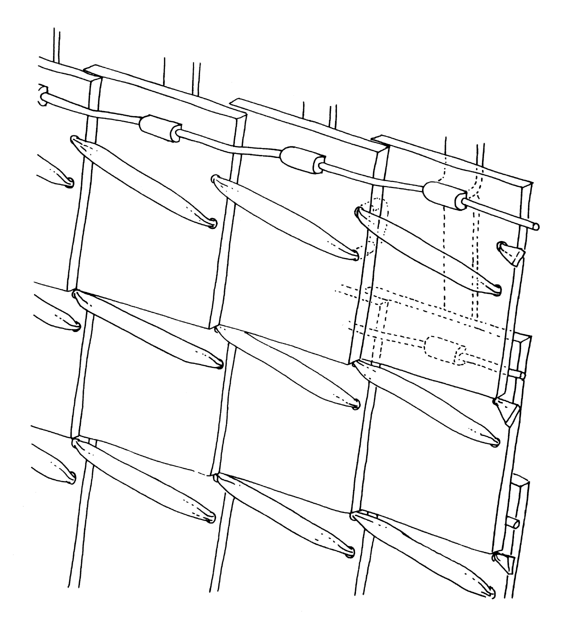
442
Leather 'lamellar' cuisse
Provenance: Tower 19
Yale no. 1938.5999.1143
Dura no. unknown
Published in *Rep.* VI, 450–1, pl. XXIII, right; Robinson 1975, 162, pl. 458

See the discussion of **441**, with which this was found, for general comments and parallels. Like the other cuisse, it was not complete when deposited; a number of scales were missing.

This is probably a cuisse for the left leg, because of the way the scales overlap. It does not form a pair with **441**, as it is of differing size, colour and construction. Its shape is also different, being more rectilinear – an inverted 'L' rather than a 'leg-of-mutton' shape. It is 660 mm high by 450 mm wide. The defence consists of twelve rows of roughly uniform scales, and it lacks the arrangement of larger scales seen at the bottom of **441**. The lamellae are 55–60 mm by 40–5 mm, made of black leather, possibly dyed or lacquered. They are now very curled up. The degree of vertical overlap of the rows is only about 10 mm, much less than on **441**, leaving the lacing exposed.

Like **441** the whole is held together by thin, horizontal laces on the front and wider vertical laces down the back. However, it differs in significant details (Fig. 67, right). The scales are joined into horizontal rows by a single lace which passes through a pair of holes just above the middle of each vertical edge of each scale. The laces, which run obliquely across the front of each 'lamella', are red leather thongs, 3–8 mm wide. The rows are joined vertically by laces of the same dimensions as the





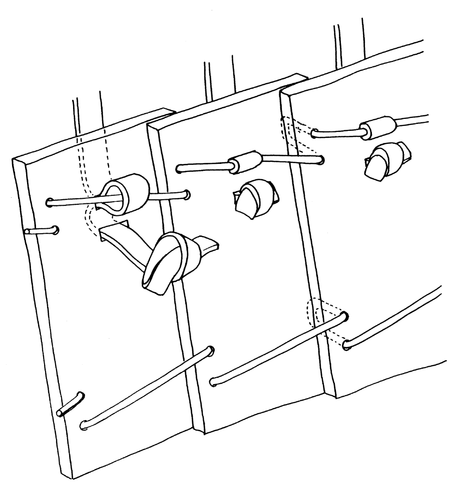


Figure 67 Schematic drawings of lacing system of **441** (left, showing top and bottom rows) and **442** (right).

equivalents on **441**, which again loop through rectangular apertures in the upper part of each scale, and over and around a horizontal lace on the front of the row. However, unlike **441**, this is not the main transverse connecting lace but a second thong, which is not attached to the scales at all; it simply runs across the face of the scales, over the slots and through the loops of the vertical laces. The advantage of this system is that an entire row of scales can easily be removed by pulling out this second lace, facilitating replacement of damaged scales without complete dismantling of the cuisse. This cannot be done with **441**.

The vertical laces are fixed at the top in the same manner as **441**. At the bottom they are stitched through by the edging thong. The edging, now fragmentary, is a thin strip of red leather, only 20 mm wide and 1 mm thick, held on by a lace running down the back, looping through the scales and back through itself.

Five attachment laces survive, one at each end of the bottom row; they are 100 mm and 300 mm long, and are presumed to be intended for tying behind the knee. There is one 400 mm long on row 6, attached to the third scale from the right. There is another on row 3, on the third scale from the right, again 400 mm in length, and one on the top row, third (surviving) scale from the left, 310 mm long.

'Lamellae' are missing from all but the lower rows. However, the laces survive, allowing the following layout to be reconstructed with some confidence. The rows are numbered from top to bottom. Numbers of surviving scales are given, along with the original numbers (in brackets).

Row	No. of scales
1	7 (13)
2	10 (13)
3	11 (13)
4	11 (13)
5	12 (13)
6	12 (13)
7	13 (13)
8	9 (9)
9	9 (9)
10	9 (9)
11	9 (9)
12	9 (9)

443 and 444

Fragmentary copper alloy scale armour, probably a pair of cuisses

Provenance: Tower 19
Yale nos 1938.4106 and 1938.4111 and others (listed below)
Dura no. unknown

This group of fragments corresponds to the published description of the 'accessory' to armoured Horse Trapper III (**451**), *Rep.* VI, 443:

> Fragments of an accessory to Housing III, or to another housing which may have perished, include:
>
> 1 A hundred or more scales, separate, or linked in strips of from two to ten, of small format. They average 0.03 m long and 0.015 m wide,

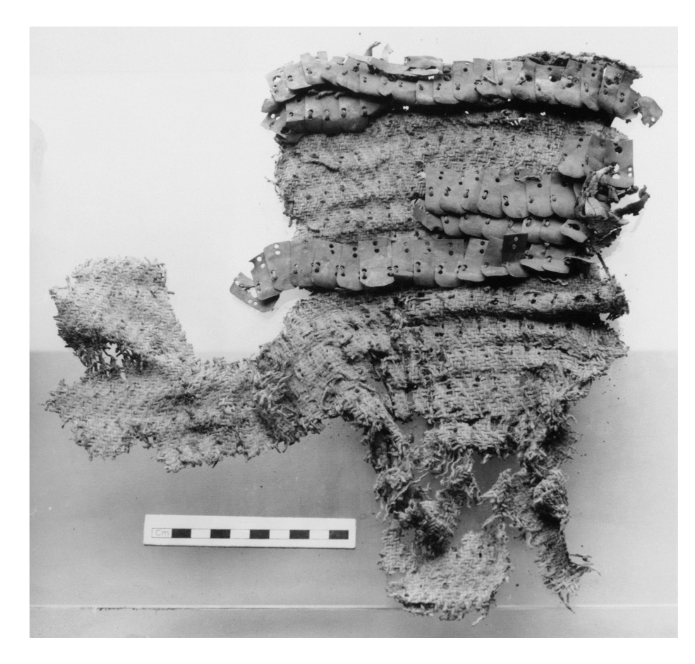


Figure 68 Scale cuisse (?) **443**, with *in situ* copper alloy scale rows, some top edge lacing and extensive areas of backing fabric preserved; the cut-out lower left corner may preserve the inverted L-shape of a cuisse like the leather **442**.

have the lower corners bevelled off, and are pierced with six holes each, two on either side and two at the top.

2. Two large fragments of an upper edge, with scales, backing, and red leather edging laced on with rawhide like the edging of the other housings and accessories. One of the fragments shows an obtuse upper corner of about 45 degrees.

There are two large fragments of cloth backing, 1938.4106, with some rows of scales adhering, and traces of leather edging strip bound with rawhide laces. There are also a number of fragmentary rows of scales.

The scales, which match the published description precisely, are attached by two threads running separately through the two upper holes in each scale. As one thread enters the outside of the upper hole, the other emerges from the lower hole and runs to the top hole of the next scale, where the first emerges through the lower aperture; in other words, the two threads form a 'double helix', and if either breaks the scale is still secured by the other.

One of the fragments preserves the obtuse upper corner seen on **442**. Both the upper and side edges are bound with leather edging strip (two pieces) attached by a running rawhide lace which passes through the strip, cloth and special large holes in the edge scales along top and sides.

There is a separate box also bearing the number 1938.4106, containing mostly loose rows of scales. Three rows are linked by edging: these have eleven, ten and one scale from top to bottom. There is a row of twenty-five, with the left-hand five having a single large hole at the top for the edging. The other rows have the following numbers of scales: 28, 17, 16, 14, 13, 12, 7, 7, 5, 4, 4, 4, 3, 3, 3. However, we cannot be sure these rows are complete.

It is difficult to be certain of the purpose of this item of armour, but it is unlikely to have been a piece of horse armour. Unlike the fragmentary armour associated with Housings I (**449**) and II (**450**), this differs from its supposedly associated trapper, Housing III (**451**), in its construction, notably in the form of its scales. In addition, the upper edge is finished with a leather binding strip and rawhide lacing, but there is no sign of a median strip to hang it over a horse's back or neck. The cloth backing is now highly fragmentary, but it may well represent an inverted 'L'-shape, similar in size and form to leather cuisse **442**. On balance I think that this item is a scale cuisse.

The scales are identical to a fragment labelled 1938.4111, which I believe to be part of a second scale cuisse (**444**). This item consists of seven fragmentary rows of scales, held together by rawhide edge-lacing. The fabric backing, and presumed leather edging, are lost. However, the lacing preserves part of the edge shape of this piece which reveals a right-angled re-entrant, again consistent with the shape of a cuisse like **442**.

'Box H' at Yale contains loose rows of scales identical to those on the fragments discussed here, which probably also come from these garments. The Yale accession numbers, followed by numbers of scales in brackets, are:

1938.4053 (2)	1938.4067 (3)
1938.4054 (8)	1938.4068 (5)
1938.4055 (7)	1938.4069 (2)
1938.4057 (5)	1938.4070 (1)
1938.4059 (5)	1938.4072 (3)
1938.4058 (10)	1938.4073 (2)
1938.4060 (10)	1938.4074 (2)
1938.4061 (2)	1938.4075 (3)
1938.4062 (4)	1938.4076 (2)
1938.4063 (4)	1938.4077 (2)
1938.4064 (3)	1938.4078 (2)
1938.4065 (5)	1938.4080 (10)

Some scales apparently from the same group of fragments are now at the Royal Ontario Museum (identified from information provided by Dr J. Hayes), ROM nos:

936.58.1 (7 scales)	936.58.3 (10)
936.58.2 (6)	936.58.4 (4)

445

Possible cuisse of iron scales
Provenance unknown
Yale no. 1938.5999.1144
Dura no. unknown

A fragment of an item of scale armour with leather and rawhide edging. It bears the identification XX/359.39 which relates to the leather conservation. The iron scales are large, of the same size and form as those on armoured Horse Trapper II (**450**), so at first sight this appears to be from horse armour. However, it is apparent that this is an upper corner and, as with cuisse **443**, there are no signs of any means of attachment to a strip of fabric or leather along the top edge to allow this to hang down the flank or neck of a horse. Again, the best parallels for the shape seem to be leather cuisses **441** and **442**, so this piece is probably from a cuisse as well. This armour would have been no heavier or more cumbersome than limb defence **446**.

446

Fragment of limb defence of iron laminated armour
Provenance: Tomb 28 'in earth fill, not in loculus'*
Yale no. 1938.5999.1145
Dura no. I282**
* According to a site record card, though this object is not mentioned in the publication (*Rep.* IX.ii, 60–1, pl. XLVIII). This means that it is not possible to be sure whether the object was part of a disturbed grave group, or an accidental inclusion as rubbish in the tomb fill. The tomb, which was 'found open and filled with earth, had obviously been plundered' (*Rep*. IX.ii, 60). It is quite likely that the object was debris from the siege which found its way into the tomb after the looting.
** This number is also seen on chape **570**.

When found, the fragment consisted of three slightly curving iron plates, the upper of which is now lost. The surviving fragment is 125 mm wide and 85 mm tall. The iron, moderately corroded, is now about 2 mm thick. The (wearer's) left-hand corner is broken, but it is clear that the defence tapered gently to a somewhat rounded lower end.

The surface is quite heavily corroded, but a difference in the texture of the oxidation products betrays the use of (presumably) leather edging, running continuously down the sides of the defence, attached by a running lace, holes for which survive through the edges of the plates. The edging will have served to reduce chafing, and may have been the primary way of holding the plates together. It would certainly have allowed the defence to flex, but would have severely limited the freedom of the individual plates to slide over each other; however, this is little disadvantage in something like a cuisse. Nevertheless, the main longitudinal connection between plates may have been a leather strap or straps, running down the back of the defence and riveted to each plate. Evidence for the use of this method, which seems to be standard on Roman *lorica segmentata* (Robinson 1975, especially figs 108–81; Allason-Jones and Bishop 1988) and other laminated defences (see below) may be seen in the two surviving rivets on the back of the plates.

The iron plates overlap upwards, unlike known segmented body armour of the era. The breadth and relative flatness of the plates make it





Figure 69 Fragments from scale cuisses (?) **443** (top) and **444**, one preserving rawhide-stitched leather edge binding as well as some copper alloy scale rows *in situ* on the textile backing. **444** has lost its backing and edging, but is held together by rawhide edge-lacing. This reveals a re-entrant, lower right, while empty lacing holes on the left edge of the scale rows suggest that this is the lower part of a cuisse like **442**.



Figure 70 Rear view of scale garment fragment **445**, showing leather edge-binding and lacing, and textile backing. Part of an iron scale is visible lower left.

probable that, rather than an arm-defence, this is the lower end of a cuisse, similar in general form to **441** to **444**, and like them intended to be worn with a greave covering the leg to above the knee. Another possibility, however, is that it was designed to cover a cavalryman's hand while grasping a lance, either as a separate piece of armour, or as a lower extension to an arm-protector. This could explain the overall size, shape and the degree of curvature of the piece; however, given the relatively large size of the component plates, and the relative inflexibility of their articulation, it could only really have covered the back of the hand to the knuckles, without extending over the fingers.

The lower end of the defence was fastened to the limb, either just above the knee or around the fingers, by straps or laces attached to the rivets or running through the larger lacing holes in the centre of the bottom edge.

This is the only piece of laminated armour identified at Dura. The Dura piece is clearly akin to the more massive, tubular limb defences used by heavy cavalry from Hellenistic times if not earlier, from Central Asia to the Mediterranean (e.g. the Hellenistic cataphract armour from Aï Khanoum: Bernard *et al.* 1980, 60–3, pl. XXXVI:a). A general parallel, albeit in copper alloy, was found in fragments at Newstead (Curle 1911, 156, pl. XXIII). A reconstruction was made by Robinson (1975, pls 503–4). The latter shows the system of articulating straps on the back. Bishop and Coulston have shown, from the curvature of the plates, that the Newstead laminated defence is an arm-guard (1993, 87). Important new finds of iron arm defences were recently made at Carlisle (Zant 2001; McCarthy *et al.* 2001). When these are studied and fully published, they may shed additional light on the Dura piece.

447

Fragments of a copper alloy greave

Provenance unknown
Yale no. 1938.3695a–d
Dura no. unknown

Recorded as 'Br[onze] shield Fragm[ents]' at Yale, the object is evidently a plain copper alloy greave of known Roman type.

Four fragments survive, and these conjoin into two larger pieces, preserving parts of both edges. The fragment of the (wearer's) right edge preserves the change from the convex curve around the calf to the concave line down towards the ankle. The surface is of smooth yellow copper alloy, embellishment being limited to two shallow ridges parallel to each edge, one right on the edge, the other about 15 mm in from it. These would have served to stiffen the piece.

In section the greave appears to have been an open 'V', with a slight median carination, to improve resistance to blows.

Roman greaves did not spring around the calf like Greek examples, but were strapped on. Signs of such attachments may be seen in the small holes, between the edge ridges, which suggest straps just below the calf muscle. Other straps may be assumed above it.

European forts have produced both infantry and cavalry greaves from third-century contexts. Presumed cavalry types are much more common, being distinguished from probable infantry patterns by inclusion of knee-guards and ankle-protectors; the supposed infantry types are simply shin-guards, presumably lacking these additional features for the sake of agility, and because the knee was protected by the large body-shield.

Fragments of at least two similar plain greaves, albeit in iron, were found in the Hebron hoard, which probably belongs to the earlier second century AD (Weinberg 1979, 85, pl. 25:6). Most 'cavalry' examples (with knee-defence) are highly decorated (e.g. Robinson 1975, pls 505–6; Garbsch 1978, pl. 3), while the rarer 'infantry' ones (without

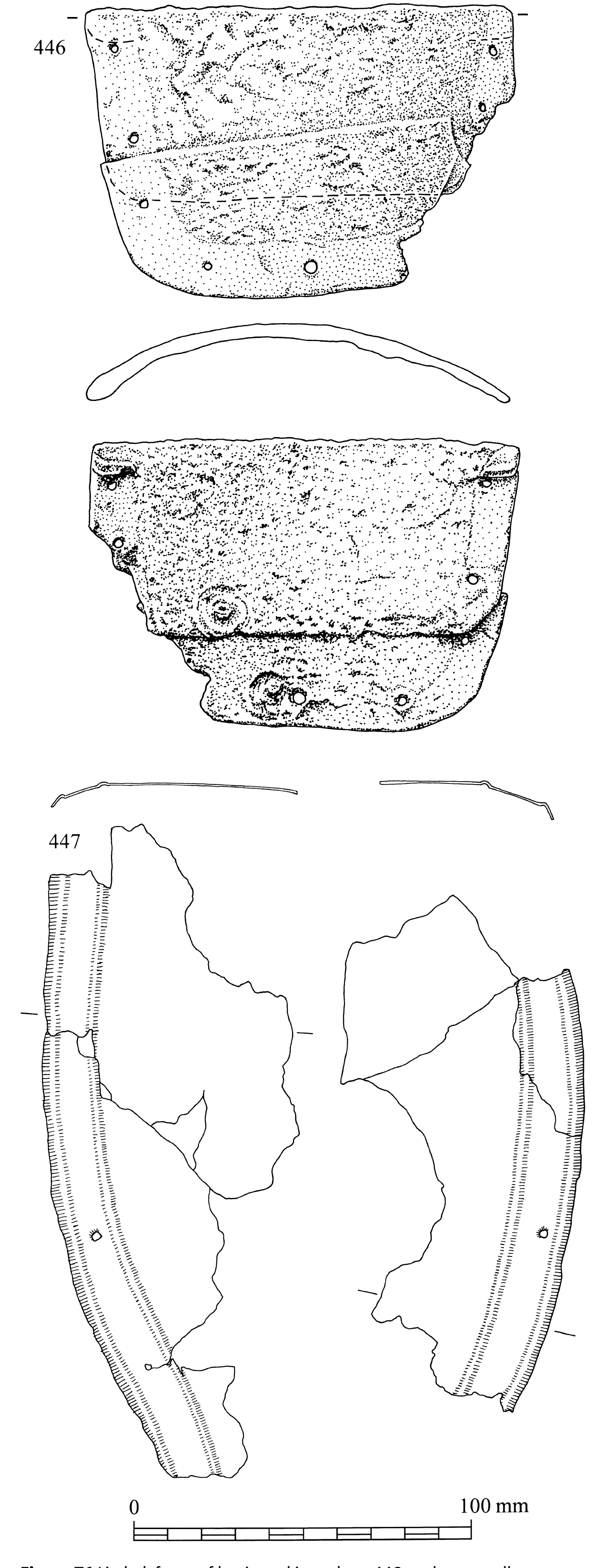


Figure 71 Limb defence of laminated iron plate, **446**, and copper alloy greave fragments **447**.



Figure 72 Limb defence of laminated iron plate, **446**.

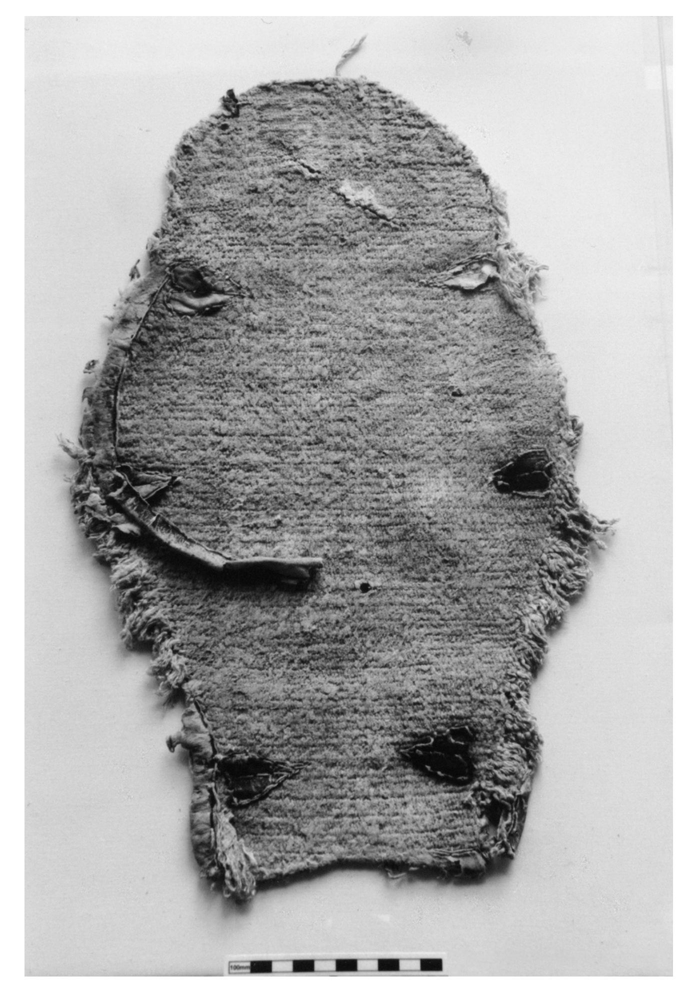


Figure 73 Fabric greave liner **448**.

knee-plate) tend to be plain like the example under discussion (e.g. Künzing: Robinson 1975, pl. 150). However, plain cavalry ones are also known, as may be seen in an example in Regensburg Museum (Robinson 1975, pl. 511). On balance, it is more likely that these fragments represent a cavalry type.

448

Fabric liner for a greave

Provenance unknown
Yale no. 1933.481
Dura no. unknown
Height 442 mm, width 270 mm

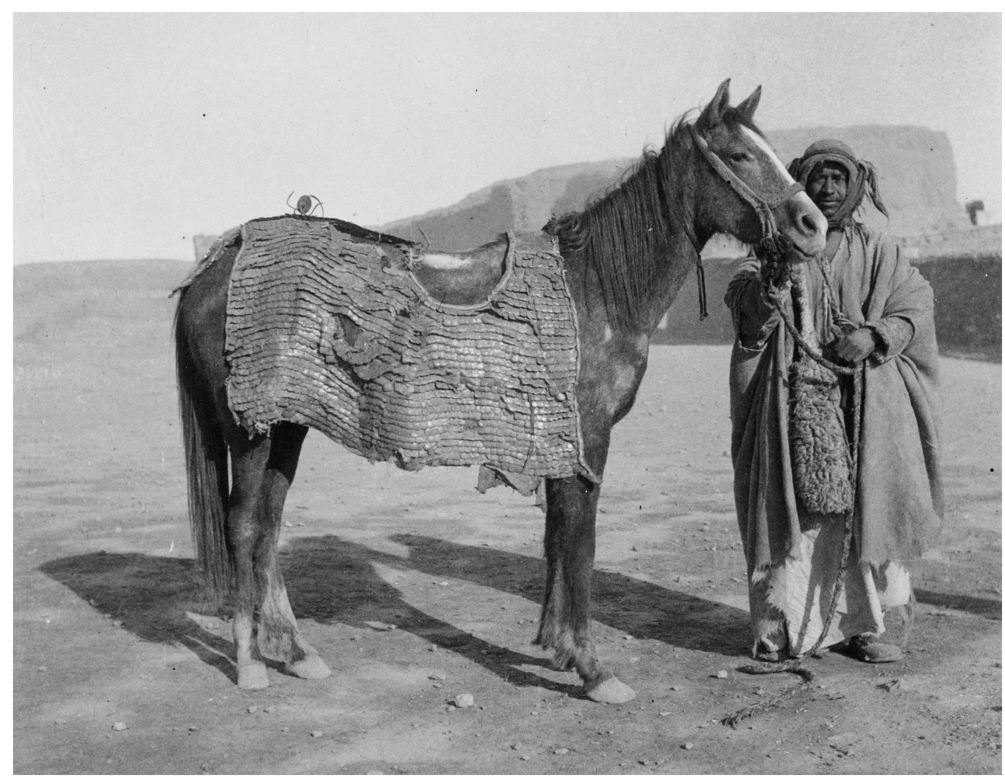
This piece was described in the *Final Report* on the textiles (Pfister and Bellinger 1945, 59, no. 292 and pls XXX, XXXII, XXXIII:D1), where it is described as a 'shinguard of very stout linen (0.5 cm thick) bound by leather sewed on by \/ undyed linen; three pairs of leather ties

originally dyed red sewed on by \/ undyed linen. Binding 1.3 cm wide. The surface has felted slightly through wear . . . Two cuts penetrating the thick fabric may be the evidence of actual combat.'

Having examined the piece I am convinced that it is a greave liner rather than a defence in its own right; five millimetres of linen would not have been very effective. It makes far better sense as a shock absorber and anti-chafing device worn between the shin and a metal greave like **447**. This explanation also accords well with the observed pattern of wear.

Given its considerable height and the curved top edge, it is clear that it covered the knee and so was designed for use with a copper alloy or iron greave of the 'cavalry' pattern discussed in relation to **447**.

No textile parallels are known, but there is a leather liner from a greave from Vindonissa (Bishop and Coulston 1993, 87).



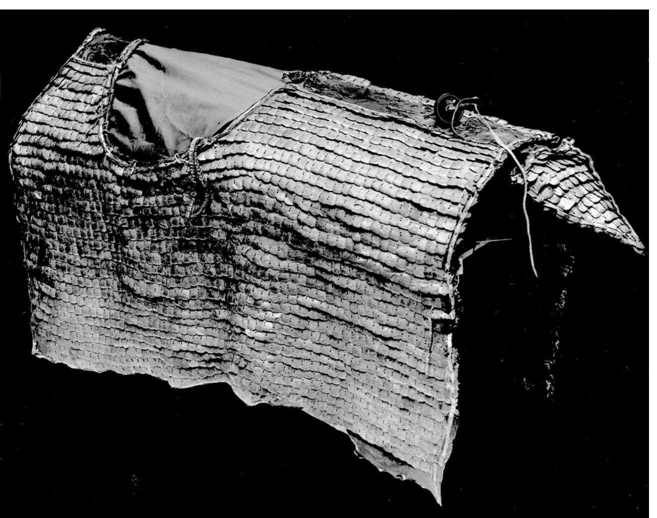


Figure 74 Horse armour **449**, of copper alloy scales, textile and leather edging, shown after conservation, and on a horse immediately after discovery. Note the pommel-loops at the rear of the saddle aperture, the wooden disk laced onto the rear median strip, and the articulated rump-guard.

Horse armour

449

Armoured horse trapper of copper alloy scales
Provenance: Tower 19
National Museum, Damascus
Dura no. unknown; possibly none given

Referred to in the publications as Housing I, it is now in Damascus (Abdul-Hak and Abdul-Hak 1951, 17, no. 40, pl. VI:2). The following is the published description (*Rep.* VI, 440–2, pls XXI and XXII:2–3), with a few clarifications and observations from my own inspection of the piece inserted in square brackets:

> The housing of bronze scale armor is in exceptional preservation, the scales very little patinated, the cloth and leather almost intact. It consists of two side pieces fastened together by a strip of leather down the center, and a tail-piece attached at one end of the same strip. [The triangular tail-piece is attached by a narrow leather strip at the centre, and at the corners by the continuation of the rawhide lace which runs up each rear edge of the main armour panels.] When laid flat it is almost perfectly rectangular, 1.22m long and 1.69m wide. In the middle of the forward end it is cut slightly back over a width of 0.70m where it passed over the horse's withers. Back 0.12 [m] from this edge is an ovoid hole 0.37m long and 0.68m wide, its long axis perpendicular to the median line, exposing the shabrack. Each half, except where it is interrupted by this hole, consists of [over the rump] thirty or [up to the withers] thirty-one strips of thin bronze scales sewn on a doubled backing of coarse linen cloth. The scales, averaging 0.035m long by 0.025m wide with rounded lower corners, are pierced with eight holes each, two on either side and four, disposed in a square, at the top. They are linked together horizontally, each overlapping the next by loops of bronze wire passed through the side holes. The strips are sewn to the backing by a cross stitch of heavy linen thread through the upper holes in such a way that each strip overlaps the one beneath it and covers the stitching. Each of the scales of the top strip on either side is punched with a large hole through which pass the rawhide thongs which lace it to the central stripping. This stripping, the front segment 0.22m wide, the rear 0.14m, consists of a double thickness of red-dyed leather. The end of the ensemble and the circumference of the saddle hole are finished off with a leather edging consisting of a strip of red-dyed leather 0.04–0.05m wide folded over the edge scales and laced with rawhide thongs through holes punched in the scales. The bottom edges were originally finished with a band of red leather skirting 0.085m wide sewn to the cloth backing with the same sort of thread as was used for the scales. The ends of the skirting were finished by a continuation of the end edging. Two considerable fragments remain of this skirting at the rear corners, a smaller fragment at the right front corner. At the left front corner, the continuation of the edging remains, though the skirting which it bound has disappeared.
>
> The garde-queue [i.e. defence for the base of the

horse's tail] is roughly triangular in shape, 0.26m long and 0.20m at its widest point. It is composed of eleven rows of scales linked horizontally and sewn on the same cloth backing as the rest of the housing. Its edges are bound with the same sort of leather edging. It is attached to the body by a loop of leather 0.055m wide passed through a slit in its own edging and laced to that of the body with a rawhide thong.

At 0.16m and 0.09m respectively from the front edge and 0.27m from the bottom on either side, are two red leather laces, the right one 0.27m long, the left 0.145m. Neither is preserved to its full length. They are simply thrust through the cloth backing and held fast by a knot at the end. One of an identical pair of laces remains left 0.035m from the rear edge and 0.335m from the bottom on the side. It is 0.135m long. No trace remains of its mate on the right.

At the centre of the rear edge of the shabrack hole a length of rawhide lace is looped through the central leather strip. Its ends are braided together by being passed through slits in each other for about 0.03m above the loop, and they continue free for 0.14–0.18m more. In the loop is threaded a flat brass ring 0.033m in diameter [the metal being *c*5 mm by 2 mm in section].

On either side of the loop and ring, 0.28m along the edge of the saddle-hole, is a larger loop of rawhide 0.12–0.13m in diameter braided in the same fashion. The ends are tied through holes punched in the adjacent scales.

Through the central leather strip 0.22m from the rear edge is looped another length of rawhide lace. The two ends, each originally 0.32m long, are first threaded through a hole in the center of a round wooden button [flat-backed, probably lathe-turned], 0.057m in diameter, and then through two slits in a second transverse length of rawhide, originally 0.70m long.

Fragments of accessories (IA) to Housing I include:

1. Several hundred scales, separate, or linked in strips of from two to eighteen, of the same format as those of the housing (average 0.025m × 0.035m).
2. Fragments of top and side edging of red leather laced to adjacent scales with rawhide laces.
3. Fragment of red leather skirting with part of cloth backing adhering. The edge of the skirting is indented in a series of triangular poins [*sic*; possibly a horse's neck defence?].
4. An important fragment of scales and backing showing an angle of about 30 degrees made by the horizontal scale strips.

Of particular interest are the two loops attached to the rear edge of the saddle hole mentioned, but not explained, in the above description (Fig. 74). It is almost certain that these were actually intended to be hooked over the rear pommels of a standard Romano-Celtic four-pommel saddle, of the type brilliantly elucidated by Connolly (1987; Connolly and van Driel-Murray 1991), and which has now been shown to have been the usual type employed in the Partho-Sasanian world as well (Herrmann 1989). Here the loops will have stopped the armour sagging and stretching below the saddle, or riding backwards over the rump. It is useful to have this indirect archaeological evidence for the type of saddle used at Dura, as no actual remains have been identified.

Accessories

It appears that some at least of the fragments of Accessory IA are at Yale. It is suggested that 1934.467 is one; it comprises a substantial fragment of a scale garment in an excellent state of preservation, complete with stitching and cloth backing, measuring about 280 by 250 mm (Fig. 75). Its provenance is given as N8-W9, but it lacks a field number, rendering the reliability of this highly questionable; a provenance in Tower 19 is suggested here, but is not certain.

The garment was made from two layers of off-white fabric, the outer coarser than the inner. Some rows of bronze scales are still attached, by thread passing through both thicknesses of fabric.

The bronze scales are 35–7 mm by 24–6 mm and about 0.25 mm thick. The lower corners have been cut off and apparently filed to eliminate sharp edges. The lower part of each scale is slightly domed to resist bending. Scales are attached to their lateral neighbours by a single twist of rectangular or circular-sectioned wire, passing through matching pairs of apparently drilled holes, 2.25 mm in diameter, and hammered flat.

Preassembled rows were sewn onto the backing fabrics by means of a cross-stitched pattern of doubled thread passing through a group of four holes at the top of each scale. It is difficult to be sure, due to the absence of some rows, but it appears that the rows were slightly staggered, so that each row is placed about one-third of a scale width to the (wearer's) left of the row below. Each row covers about 13 mm of the scales below, thus protecting the stitching but not the staples.

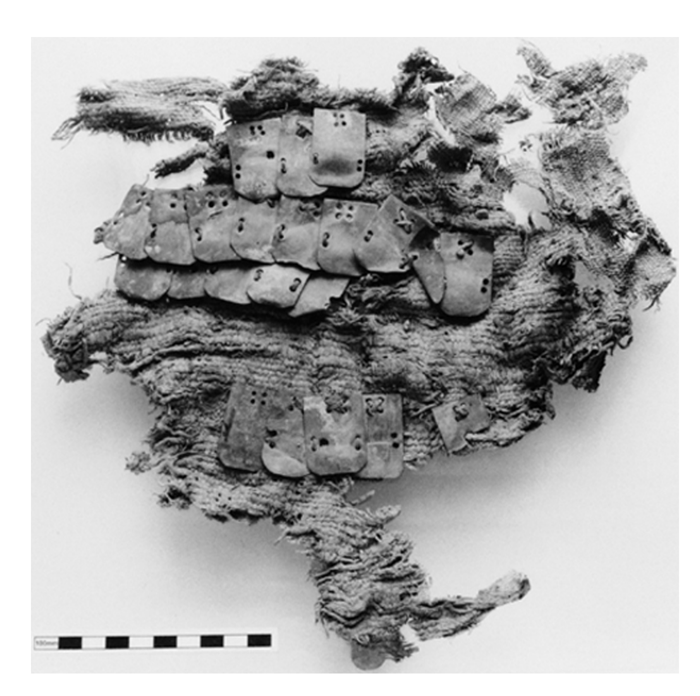


Figure 75 Accessory to **449**.



Figure 76 Accessory to **449**, detail of repairs: NB in two of the scale rows the direction of overlap changes. Piercing in some of the scales suggests they are reused, originally having been transfixed by lacing on the edge of a garment.

The piece shows evidence of repair, e.g. one scale overlaps both its neighbours, and some have crudely punched holes (Fig. 76). Some scales have an extra-large hole, possibly for attaching laces. More probably, they are reused scales originally from the leather-laced edge of a garment.

A second fragment from this garment (not illust.) preserves part of the lateral edging. It consists of two pairs of scales linked by leather edging with rawhide stitching. The fabric backing has perished. These scales constitute the ends of two rows; there is one row missing between them. The edging is a 40 mm wide strip of leather, wrapped around the edge of the scales, and attached by two running laces of rawhide, which pass through the strip, through a large hole in each scale, and back through each other.

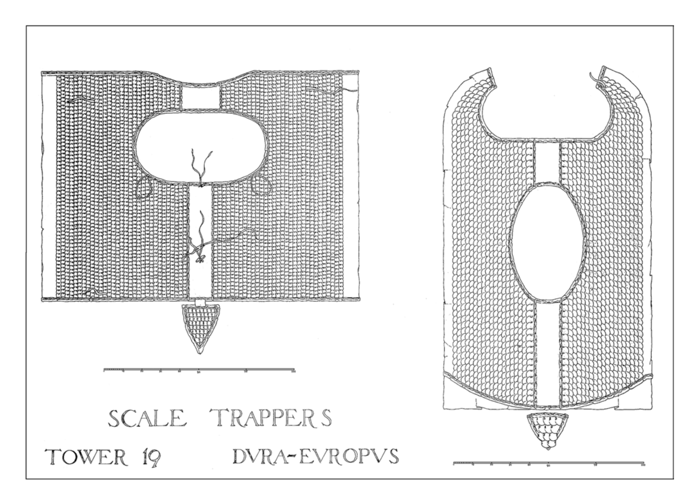


Figure 77 Schematic drawings of trappers **449** (left) and **450**, after *Rep.* VI, pl. XXI. Some details are inaccurate: compare the front edges of **450** with Fig. 78.

A third fragment (1934.465; not illust.) represents the lower edge of the garment. It is the bottom row of scales, which all have a central large hole through which runs a rawhide lace for binding the edging. With this is a piece of leather, a strip about 100 mm wide, with a serrated lower edge and sewing holes for attachment to the fabric backing set at 15 mm intervals, 4 mm from the top edge, and holes for the laces set 20 mm from the top edge. This appears to match the description of fragment 3 (above). It is possibly from a horse's neck armour.

Box E1

A box at Yale marked 'E1' contains hundreds of scales of the same format, mainly in short rows, which can be identified as those mentioned under the list of Accessory 1A fragments, item 1. These include the following numbered scales and rows (number of scales in brackets):

1938.3766 (1)	1938.4018 (2)
1938.3992 (2)	1938.4019 (2)
1938.3993 (2)	1938.4020 (2)
1938.3995 (2)	1938.4021 (3)
1938.3996 (3)	1938.4022 (2)
1938.3997 (2)	1938.4023 (4)
1938.3998 (2)	1938.4024 (2)
1938.3999 (2)	1938.4025 (2)
1938.4000 (2)	1938.4026 (2)
1938.4001 (2)	1938.4027 (2)
1938.4002 (2)	1938.4030 (4)
1938.4003 (2)	1938.4031 (2)
1938.4004 (2)	1938.4032 (2)
1938.4005 (6)	1938.4034 (2)
1938.4006 (2)	1938.4036 (2)
1938.4008 (3)	1938.4037 (2)
1938.4009 (5)	1938.4038 (3)
1938.4010 (2)	1938.4039 (2)
1938.4011 (2)	1938.4040 (2)
1938.4012 (2)	1938.4041 (2)
1938.4013 (2)	1938.4107 (10)
1938.4015 (2)	1938.4108 (4)
1938.4016 (3)	1938.4109 (5)
1938.4017 (2)	1938.5999.1037 (4)

Box E2

This also contains scales of the same type, although three of these (1931.599 (part of), 1938.4114 and 4118) have provenances other than Tower 19, showing that this type of scale was used in other garments elsewhere. However, it remains likely that the following belong to the garment under discussion:

1938.3987 (4)	1938.4047 (4)
1938.3991 (6)	1938.4048 (2)
1938.4042 (1)	1938.4049 (3)
1938.4043 (2)	1938.4050 (2)
1938.4044 (1)	1938.4051 (2)
1938.4045 (1)	1938.4052 (2)

Others now physically separated from the group but probably belonging to it include 1938.4007 (6), 1938.5999.1111 and 1938.5999.1112.

There are in addition some sixty loose, unnumbered scales, and a handful of scales of a slightly larger format (42 by 30 mm), perhaps a repair to this garment, but possibly intrusive, having been thrown into the box at some later date on grounds of similarity. These include 1938.4014 and four unnumbered scales.

There are also rows of scales of the same type and in the same condition as part of a group numbered 1938.4111. It seems likely that they are also from this piece of armour. They include long rows with angled leather and rawhide edging, and may equate to fragments 2 and 4 listed above.

Some scales of this type are now at the Royal Ontario Museum. Information provided by Dr J. Hayes allows ROM numbers 933.25.10–14 (comprising 1, 2, 3, 7 and 19 scales respectively) tentatively to be assigned to the accessory.

It seems likely from the published description and study of the fragments that all these are parts of a neck defence.

There are no known Roman archaeological parallels for such horse armour outside Dura, although documentary evidence makes it clear that it was widely used in the Roman army from the third century onwards, and that armour for horses of various types was commonly used across Asia from the Hellenistic period if not earlier (see pp. 113–14). An interesting example of what appears to be a chest-protector for a horse was found in a Hellenistic context at Aï Khanoum in Afghanistan (Bernard *et al.* 1980, 61, pl. XXXVIII:b).

450

Armoured trapper of iron scales
Provenance: Tower 19
Yale No. 1933.680
Dura no. unknown

This piece is referred to in the published report as Housing II, and is apparently the trapper pictured by Hopkins shortly after excavation (1979, 189). A piece of the textile backing has been published separately (Pfister and Bellinger 1945, 64, no. Tr.33–28). The published description (*Rep.* VI, 442–3, pls XXI and XXII:1, with my additional comments in square brackets) reads:

> The housing of iron scale armour is somewhat less well preserved than [Housing] I, but nearly intact. It is made all in one piece, strengthened by a strip of leather down the center, from which the strips of scales overlap downward on either side. Laid out, it is very nearly rectangular, 1.48 m long and 1.10 m wide. At the two front corners, however, it is produced [*sic*] 0.30 m in two curving extensions 0.16 m wide designed to meet across the horse's breast. The rear edge is rounded off so that the rear corners are 0.18 m back of the center. The ovoid shabrack-hole, 0.28 m from the front edge, is 0.61 m long and 0.38 m wide, with its long axis in the median line of the housing. The scales, averaging 0.06 m long by 0.045 m wide by 0.004 m thick, are rounded at the bottom and pierced with eight holes each, two small ones at either side and four larger ones in a square at the top. They are linked together by staples of bronze wire through the side holes,* and sewn in nineteen overlapping rows on each side of the center strip, to a single thickness of coarse cloth resembling burlap [it is a coarse-fibre linen twill: Pfister and Bellinger 1945, 64]. The sewing is done with fine rawhide laces with a regular over-one-under-one stitch.
>
> The center stripping, each segment of it 0.15 m wide, is of heavy, untanned, uncolored leather. It is laced to the adjacent scales on either side with rawhide laces. As in I, both ends of the housing and the shabrack-hole are finished with fine red leather edgings folded over the edges of the scales and laced to them. The same laces along the rear edges attach two triangular flaps of the same untanned leather as the center strip, 0.18 m wide at their ends, which take up the rounding off of the rear edge. The bottom edges have a skirting of red leather, similar to that of Housing I, 0.05 m wide, sewn with coarse thread to the cloth backing.
>
> The triangular garde-queue, 0.215 m on a side, is crudely made of four unevenly overlapping rows of scales laced to a backing of untanned leather with rawhide laces. This backing itself was first bound with a red leather edging; then backing and scales were rebound with one of untanned leather, which passed under the edges of the two bottom rows of scales.
>
> The remnant of a tie-lace remains thrust through the pierced top corner scale of the right front extension.
>
> Fragments of accessories (IIA) to Housing II, include:
>
> 1 One hundred or more scales, separate, or linked in strips of from two to eight of the same format as those of the housing (average 0.06 m × 0.045 m).
> 2 Fragments of two lower outside corners, scales on backing, red leather side edging, and indented bottom skirting.
>
> *The scales and staples are technically analyzed by John W. Higgins of the Worcester Pressed Steel Co., Worcester, Mass., as follows: The iron plates are hammered uniformly thin, annealed soft with a slight blue scale and

Figure 78 Horse armour **450**. In this archive photograph the trailing-edge leather flaps have been erroneously cropped off.



Figure 79 Horse armour **450** placed on a horse, immediately after discovery. In this view, it is evident that its lower edge was high enough not to interfere with the horse's legs, especially where it was carried round in front, below the throat.

> no indication of burning, work-hardening, brittleness, or bad lamination. The marks are still on the plates, as though they were polished yesterday, and scarcely any rust. The wire staples are sheared or forged, not die drawn.

My own scrutiny of this piece adds some more details. Each row is sewn above and slightly to the rear of the one below. Generally, on each side the scales overlap their neighbour to the rear, as would be expected, to deflect projectiles coming from the front. However, this is not consistent; half of one row overlaps the other way, which must surely be a botched repair, apparently made in antiquity. The overlaps are particularly chaotic at the top of the garment, in front of the saddle hole. There also seems to be a fairly random scatter of scales with additional unused lacing holes, which also probably represent repairs with scales taken from edge positions on other trappers.

The published drawing (Fig. 77) shows that there are projecting leather strips along the rear edge of the trapper, but incorrectly shows their shape; strangely, they were cropped from the published photograph (*Rep.*VI, pl. XXII:1; Fig. 78). However, a hitherto unpublished photograph (Fig. 79) shows that this trapper, like **449**, was put on the back of a pony, which, whatever the demerits for conservation, was a useful exercise, as it shows how these leather flaps closed around the tail of the horse, providing all-round protection. It also makes it clear that, as might be expected, the armour was just deep enough to cover the body of the animal without interfering with the movement of the legs.

Some items at Yale may be equated with the fragmentary 'accessory', perhaps including a row of eight iron scales numbered 1938.5999.1032. There is also a leather edging fragment (1933.713), probably from a neck defence (not illustrated). It is a lower edge and is indented. A corner survives, as does part of the fabric backing. The leather bears impressions of the bottom row of large, presumably iron, scales. It was clearly similar to **452**.

451

Fragments of an armoured trapper of copper alloy scales
Provenance: Tower 19
Yale and Royal Ontario Museum nos below
Dura no. unknown

Referred to in the publications as Housing III, this had completely dissolved into fragments due to the loss of all the organic parts, probably because it was on the top of the pile of debris (*Rep.* VI, 439) and so was most vulnerable to rain and biological attack.

The published description (*Rep.* VI, 443) reads:

> Housing III consists of scales whose backing and leather work have wholly disintegrated. They average 0.04 m long and 0.025 m wide, rounded at the bottom, and are linked with bronze wire in strips of from two to forty. All have the normal two holes on either side, but the majority have a single large hole at the top and were evidently laced to their backing with rawhide. A few have four holes arranged in a square at the top for thread stitching.



Figure 80 Rows of scales from horse armour **451**.

All that can be determined from the position in which the scales lay when excavated was that they originally made up a housing similar to I and II. At a rough estimate there were two thousand or more individual scales.

Fragments of an accessory to Housing III, or to another housing which may have perished, include:

1 A hundred or more scales, separate, or linked in strips of from two to ten, of small format. They average 0.03 m long and 0.015 m wide, have the lower corners bevelled off, and are pierced with six holes each, two on either side and two at the top.
2 Two large fragments of an upper edge, with scales, backing, and red leather edging laced on with rawhide like the edging of the other housings and accessories. One of the fragments shows an obtuse upper corner of about 45 degrees.

Horse Armour III had apparently been struck by a catapult bolt, but the circumstances are unclear (*Rep.* VI, 439).

There are a number of boxes at Yale containing hundreds of scales in excellent condition, loose and in rows, which fully match the description of those found in Tower 19 and assigned to the disintegrated Housing III. The scales measure about 40 mm by 25 mm, with lateral staple holes and for the most part a large single hole at the top which must indeed suggest that the rows were largely attached by rawhide laces. The top corners are also sometimes clipped off, presumably to reduce chafing on the laces. Rows overlap in both directions. The yellow copper alloy scales tend to be slightly domed at the bottom.

The following lists draw on my own scrutiny of the objects, and also on the listings made by Donald Wright (1963), who does not appear to have made the identification with Housing III. They are certainly not complete, as some numbers listed in the Yale archives seem to be missing from Wright's lists. This may be partly explained by the appearance of some pieces at, for instance, the Royal Ontario Museum (identified from information provided by Dr J. Hayes; there is no record of this transfer in the Yale Dura archive). I suspect more groups of scales may have gone to other unrecorded destinations.

Most of the scales are in labelled boxes as follows:

Yale box 'A1'
A box of a total of 63 loose scales (collectively 1938.5999.1146).

Yale boxes 'A' and 'A2' to 'A6'
Accession numbers, followed by numbers of scales in brackets, collated and rearranged from Wright 1963, and Yale accession records:

1938.3744 (34) 1938.3778 (5)
1938.3745 (15) 1938.3779 (5)
1938.3746 (25) 1938.3780 (12)
1938.3747 (26) 1938.3781 (2)
1938.3748 (31) 1938.3782 (12)
1938.3749 (21) 1938.3783 (14)
1938.3750 (24) 1938.3784 (7)
1938.3751 (23) 1938.3785 (7)
1938.3752 (18) 1938.3786 (6)
1938.3774 (8) 1938.3787 (7)
1938.3775 (15) 1938.3789 (9)
1938.3775a (8) 1938.3790 (9)
1938.3776 (13) 1938.3791 (3)
1938.3777 (9) 1938.3792 (5)

1938.3793 (10) 1938.3846 (3)
1938.3794 (8) 1938.3847 (3)
1938.3795 (10) 1938.3848 (3)
1938.3796 (9) 1938.3849 (3)
1938.3797 (11) 1938.3850 (7)
1938.3798 (11) 1938.3851 (10)
1938.3799 (6) 1938.3852 (2)
1938.3800 (12) 1938.3853 (2)
1938.3801 (9) 1938.3854 (3)
1938.3802 (6) 1938.3855 (5)
1938.3803 (4) 1938.3856 (14)
1938.3804 (3) 1938.3857 (6)
1938.3805 (3) 1938.3858 (10)
1938.3806 (9) 1938.3859 (7)
1938.3807 (8) 1938.3860 (6)
1938.3808 (8) 1938.3861 (10)
1938.3809 (5) 1938.3862 (12)
1938.3810 (3) 1938.3863 (1)
1938.3811 (4) 1938.3864 (6)
1938.3812 (5) 1938.3865 (5)
1938.3813 (4) 1938.3866 (2)
1938.3814 (4) 1938.3867 (3)
1938.3815 (8) 1938.3868 (2)
1938.3816 (4) 1938.3869 (2)
1938.3817 (2) 1938.3870 (4)
1938.3818 (4) 1938.3871 (3)
1938.3819 (5) 1938.3872 (7)
1938.3820 (9) 1938.3873 (2)
1938.3821 (5) 1938.3874 (4)
1938.3823 (1) 1938.3875 (1)
1938.3824 (4) 1938.3876 (2)
1938.3825 (8) 1938.3877 (3)
1938.3826 (4) 1938.3878 (9)
1938.3827 (10) 1938.3879 (7)
1938.3828 (2) 1938.3880 (9)
1938.3829 (3) 1938.3881 (6)
1938.3830 (8) 1938.3882 (3)
1938.3831 (8) 1938.3883 (2)
1938.3832 (3) 1938.3884 (6)
1938.3833 (?) 1938.3885 (4)
1938.3834 (8) 1938.3886 (4)
1938.3835 (6) 1938.3887 (9)
1938.3836 (3) 1938.3888 (9)
1938.3837 (6) 1938.3889 (11)
1938.3838 (2) 1938.3890 (8)
1938.3839 (8) 1938.3891 (6)
1938.3840 (2) 1938.3892 (2)
1938.3841 (2) 1938.3893 (3)
1938.3842 (4) 1938.3894 (3)
1938.3843 (6) 1938.3895 (11)
1938.3844 (2) 1938.3896 (7)
1938.3845 (6) 1938.3897 (8)

1938.3899 (7) 1938.3943 (2)
1938.3900 (19) 1938.3944 (6)
1938.3901 (3) 1938.3945 (4)
1938.3902 (3) 1938.3946 (5)
1938.3903 (2) 1938.3947 (8)
1938.3904 (4) 1938.3948 (2)
1938.3905 (2) 1938.3949 (5)
1938.3906 (2) 1938.3950 (7)
1938.3907 (3) 1938.3951 (4)
1938.3908 (4) 1938.3952 (7)
1938.3909 (5) 1938.3953 (2)
1938.3910 (5) 1938.3954 (4)
1938.3911 (4) 1938.3955 (3)
1938.3912 (3) 1938.3956 (3)
1938.3913 (2) 1938.3957 (4)
1938.3914 (?) 1938.3958 (2)
1938.3915 (?) 1938.3959 (2)
1938.3916 (5) 1938.3960 (2)
1938.3917 (5) 1938.3961 (2)
1938.3918 (2) 1938.3962 (2)
1938.3919 (3) 1938.3963 (3)
1938.3920 (6) 1938.3964 (3)
1938.3921 (2) 1938.3965 (2)
1938.3922 (3) 1938.3966 (3)
1938.3923 (7) 1938.3967 (3)
1938.3924 (9) 1938.3968 (2)
1938.3925 (6) 1938.3969 (5)
1938.3926 (5) 1938.3970 (4)
1938.3927 (2) 1938.3971 (2)
1938.3930 (6) 1938.3972 (2)
1938.3931 (5) 1938.3973 (2)
1938.3932 (5) 1938.3974 (2)
1938.3933 (3) 1938.3975 (3)
1938.3934 (2) 1938.3976 (3)
1938.3935 (6) 1938.3977 (6)
1938.3936 (7) 1938.3978 (3)
1938.3937 (3) 1938.3979 (2)
1938.3938 (4) 1938.3980 (2)
1938.3939 (3) 1938.3982 (?)
1938.3940 (2) 1938.3983 (4)
1938.3941 (10) 1938.3984 (4)
1938.3942 (6) 1938.3986 (1)

It is probable that the following boxes of scales also belong to this garment:

Yale box 'B'
Identical to the above scale types, except that in some cases the top corners are not cut off.

1938.3768 (20) 1938.3771 (3)
1938.3769 (23) 1938.3772 (1)
1938.3770 (5) 1938.3985 (1)

Yale box 'Mix, A&B, A&E'
This includes two rows of scales with either a single, large upper hole or four small holes at the top edge, in the same row.

1938.3898 (3)
1938.3982 (6)
1938.3989 (10)

Yale box 'C and D'
Some of the contents of this box also appear to be part of the same garment, with standard scales with a large upper hole but with two or three additional apertures.

1938.3754 (21) 1938.3760 (4)
1938.3755 (4) 1938.3761 (5)
1938.3757 (6) 1938.3990 (7)
1938.3758 (6)



Figure 81 Fragment of horse armour, **452**.

Pieces at the Royal Ontario Museum
Information about items at the Royal Ontario Museum kindly provided by Dr Hayes strongly suggests that they are also part of this armour, although there is no record of their Dura or Yale numbers (if they were ever assigned any). They comprise ROM numbers:

933.25.15 (10) 933.25.18 (10)
933.25.16 (4) 933.25.19 (12)
933.25.17 (4)

'Accessory'?
A group of fragments bearing the Yale no. 1938.4106 correspond to the description of the 'accessory' to Housing III. Close inspection and a parallel piece suggest that these represent a cuisse or pair of cuisses rather than horse armour. They are fully discussed as **443** and **444**.

452

Fragment of iron scale horse armour
Provenance unknown
Yale no. 1929.771*
Dura no. unknown
* This also bears the designation xx/369.46, which relates to the conservation of its leather part.

A lower corner of a scale garment, of large iron scales on a fabric backing, with leather edging. It appears that this cannot be part of the hoard of material found in Tower 19, as it was already at Yale by that time.

Only two heavily corroded scales survive, with fragments of a third and fourth. The best preserved scale measures 72 by 52 mm. The bottom is roughly semicircular. The scales are linked by copper alloy wire of circular section, 1.5 mm thick, running through two holes in each edge.

Attachment to the backing appears to be by means of a group of four holes in a square at the top of the scale. One of the surviving scales has extra holes for lacing the edge strip. The overlap of the scale rows covers the top stitching, but not the lateral staples.

The fabric backing is a doubled thickness of coarse cloth, folded back on itself to the side. The stitching thread is 2.5 mm thick.

The lateral edge is bound with a strip of leather 55–60 mm wide and about 1 mm thick, held in place by leather laces which pass right through all layers. The edging strip extends about 40 mm below the edge of the scales and cloth, and is cut into seven strips or tassels about 8 mm wide, apparently for decoration.

The lower edge of the garment is a strip of leather about 110 mm deep and 1 mm thick. It was sewn to the front of the cloth by coarse thread, but under the scales. About 75 mm of the depth of the strip is visible. Its lower edge is cut into a saw-tooth pattern, about 17 mm deep and 11–20 mm from peak to peak. Two parallel tooling lines are visible 35 mm above the bottom edge on the surface of the leather, which is now almost black although this is probably a result of conservation.

The size of the scales, the vertical edge and the serrated lower edge suggest that this is a fragment of an armoured trapper like that from Tower 19, or more likely part of a horse's neck armour.

Miscellaneous scale armour

453

Fragment of lamellar-like copper alloy scale garment (Figs 82 and 83)
Provenance unknown
Yale no. 1938.4091
Dura no. unknown

Small scales, 8–9 mm wide by 18 mm long with a paraboloid lower edge, which apparently were held together entirely by metal staples without an attached fabric backing. Rows are held together by the usual vertical pairs of holes on the sides, while the rows are attached to each other by similar vertical pairs of holes in both the top and bottom of each scale. The scales are linked by copper alloy wire of circular section. The (wearer's) left side of the scales overlap.

This garment is relatively stiff due to the attachment of scale rows vertically as well as horizontally, which also increases the protective value of the garment. In this, and the lack of backing, it is like conventional lamellar armour.

This is a widely distributed, if not very common type of armour (Bishop and Coulston 1993, 117), known from Britain (Corbridge: Robinson 1975, 162, fig. 174; Colchester: Crummy 1983, 138, no. 4246, fig. 161) to the Danube (Hrusica: Garbsch 1978, 79, no. P18, pl. 35:2; Dacia Inferior: Vladescu 1975, fig. 27; Mušov, Slovakia: Tejral 1990, fig. 1:A; Pác: Krekovič 1994, 220, no. 7, fig. 8).

454

Fragment of lamellar-like copper alloy scale garment
Provenance unknown
Yale no. 1938.4115
Dura no. unknown

Scales of similar shape to **453**, but 21–2 mm by 7 mm. The copper alloy staples are formed as broad loops, perhaps partly to allow more flexibility but perhaps also for looping over horizontal threads as attachment to a fabric backing.

There is a good parallel from Razgrad, Bulgaria (Alfs 1941, fig. 27).

455

Fragments of lamellar-like copper alloy scale garment (Figs 82 and 83)
Provenance: D1–13
Yale no. 1938.4138
Dura no. H734

The scales, 18 by 25 mm with a paraboloid lower edge, are fastened to each other with very wide staples, probably to allow a backing to be threaded onto them. The scales are now corroded together.

456

Fragment of lamellar-like copper alloy scale garment
Provenance unknown
Yale no. 1932.1403 (part of)
Dura no. unknown

A small fragment of about half a dozen angular scales, each with the lower corners cut off. The scales are *c.* 30 by 15 mm.

457

Fragment of lamellar-like copper alloy scale garment (Figs 82 and 83)
Provenance: N7-W2
Yale no. 1938.4131
Dura no. H287

A row of three scales with rounded lower ends. Each is about 10 by 28 mm.

Closely similar to a fragment found at Zeugma (Kennedy with Bishop 1998, 137, fig. 8.14.

458

Fragment of lamellar-like copper alloy scale garment (Figs 82 and 83)
Provenance unknown
Yale no. 1938.4136 (part of)
Dura no. unknown

Six scales in two rows of three. Each scale is 8 by 13 mm.

459

Fragment of lamellar-like copper alloy scale garment (Figs 82 and 83)
Provenance: 'Ramp. SW corner'
Yale no. 1938.4105
Dura no. I219

A fragment with nineteen scales, each 17 by 28 mm, in excellent condition, although any backing that there may have been is now

lost. The scales have a roughly semicircular lower edge. The staples are of fairly broad copper alloy strip and allow a considerable degree of flexibility.

460
Fragment of lamellar-like copper alloy scale garment
Provenance unknown
Yale no. 1931.599 (part of)
Dura no. unknown

A fragment with four broken scales, each 20 by 27 mm, from the upper edge of a garment. The upper row is stapled at the bottom, but has single large holes at the top almost certainly for a laced leather edging.

461
Fragment of lamellar-like copper alloy scale garment (Fig. 83)
Provenance: X7-5
Yale no. 1938.4110 (part of)
Dura no. I741

A fragment with about a dozen scales, each 15 by 28 mm, corroded together. The lower corners of the scales are clipped off. Now recognized as from the same garment as **419**.

462
Fragment of lamellar-like copper alloy scale garment
Provenance unknown
Yale no. 1938.5999.1010
Dura no. unknown

A fragment with about seven scales, each 9 by 22 mm, corroded together. The lower edge of the scales is a long parabola.

463
Fragment of lamellar-like copper alloy scale garment
Provenance unknown
Yale no. 1938.5999.1011
Dura no. unknown

A fragment with about a dozen broken scales, each 7 by 25 mm, corroded together. These scales are particularly slender, with a paraboloid lower edge.

464
Fragment of lamellar-like copper alloy scale garment
Provenance unknown
Yale no. 1938.5999.1012
Dura no. unknown

A fragment with four or five broken scales, each originally 10 by 20 mm, corroded together.

465
Fragment of lamellar-like copper alloy scale garment
Provenance unknown
Yale no. 1938.5999.1013
Dura no. unknown

A fragment with about eight broken scales, each 10 by 27 mm, corroded together. The scales have paraboloid lower edges. A large fragment of armour with near-identical scales and method of attachment is known from Mušov in Slovakia. It dates to the later second or earlier third century (Tejral 1990, fig. 1:A).

466
Copper alloy scale from a lamellar-like garment (Figs 82 and 83)
Provenance: F3-6
Yale no. 1938.4126
Dura no. F845
Height 25 mm, width 14 mm

A scale with a paraboloid lower edge.

467
Copper alloy scale from a lamellar-like garment (Figs 82 and 83)
Provenance: J7-D1
Yale no. 1938.4133
Dura no. F1228
Height 27 mm, width 10 mm

A scale with a paraboloid lower edge.

468
Double-stapled copper alloy scales
Provenances unknown
Dura nos unknown

A number of quite large, roughly square scales (32–4 mm tall by 29 mm wide), with four stitching holes at the top and two staples instead of the usual one on each edge, are at Yale, under a variety of numbers (below). The upper stitching holes are in two quite widely spaced pairs. The lower corners of each scale are clipped.

These scales all seem to be in the same very good state of preservation and may well have been found together, but their provenance is lost.

Given their relatively large size and sturdy lateral fixings, perhaps these are from horse armours. Virtually identical scales are known from Dacia Inferior (Vladescu 1975, figs 26–7). Yale numbers (with number of scales):

1938.4092 (1)	1938.4099 (1)
1938.4093 (1)	1938.4100 (1)
1938.4095 (2)	1938.4101 (1)
1938.4096 (2)	1938.4102 (1)
1938.4097 (1)	1938.4104 (1)
1938.4098 (1)	

469
Double-stapled copper alloy scale (not illustrated)
Provenance: B2-A1-A2
Yale no. 1938.4121
Dura no. F114
Height 35 mm, width 29 mm

A single scale of the same type as **468**.

470
Double-stapled copper alloy scale (not illustrated)
Provenance: L7-W1
Yale no. 1938.4122
Dura no. F444
Height 32 mm, width 29 mm

A single scale of the same type as **468**.

471
Double-stapled copper alloy scale (not illustrated)
Provenance: B2-A4
Yale no. 1938.4123
Dura no. F137
Height 33 mm, width 28 mm

A single scale of the same type as **468**.

472
Double-stapled copper alloy scale (Figs 82 and 83)
Provenance: E4-20-24
Yale no. 1938.4116
Dura no. F324
Height 32mm, width 35 mm

A particularly wide example of the type of scale represented by **468**.

473
Double-stapled copper alloy scale
Provenance unknown
Yale no. 1938.5999.1014
Dura no. unknown.

One incomplete scale, with an attached fragment of a second, of the same type as **468**.

474
Row of iron scales
Provenance unknown
Yale no. 1938.5999.1015
Dura no. unknown
Height 65–80 mm, width 45–50 mm

A row of eight iron scales with lateral copper alloy wire staples and four holes near the upper edge. Probably from horse armour.

475
Large iron scale
Provenance unknown
Yale no. 1938.5999.1147
Dura no. unknown
Height 64 mm, width 47 mm

A fairly standard large scale with lateral staple holes and a square of lacing holes at the top. There are also two larger holes probably to take lacing for an edge-binding. Probably from horse armour.

476
A row of large iron scales
Provenance unknown
Yale no. 1930.594 (part of)
Dura no. unknown
Height 59 mm, width 45 mm

Similar to **475**, a row of three scales attached with copper alloy staples and a singleton with holes probably for edge trimming. These cannot be part of the Tower 19 complex because of their early accession date.

477
A row of large iron scales
Provenance unknown
Yale no. 1938.5999.1148
Dura no. unknown
Height 57–9 mm, width 43–5 mm

A row of four scales with copper alloy staples, like **476**.

478
A row of large iron scales
Provenance unknown
Yale no. 1938.5999.1149
Dura no. unknown
Height 47–8 mm, width 33–7 mm

Similar to **476**.

479
A row of large iron scales (Fig. 83)
Provenance unknown
Yale no. 1938.5999.1016
Dura no. unknown
Dimensions not measured

A row of seven scales with the standard copper alloy staples and four stitching holes. The right-hand end scale has a lacing hole. Probably horse armour.

480
A row of large iron scales (not illustrated)
Provenance unknown
Yale no. 1938.5999.1017
Dura no. unknown
Dimensions not measured

A row of nine scales with the standard copper alloy staples and four stitching holes, quite heavily corroded. Probably horse armour.

481
A large iron scale
Provenance unknown
Yale no. 1938.5999.1150
Dura no. unknown
Height 80 mm, width 41 mm

A rather long thin scale, with three staple holes on one side and a larger lace hole.

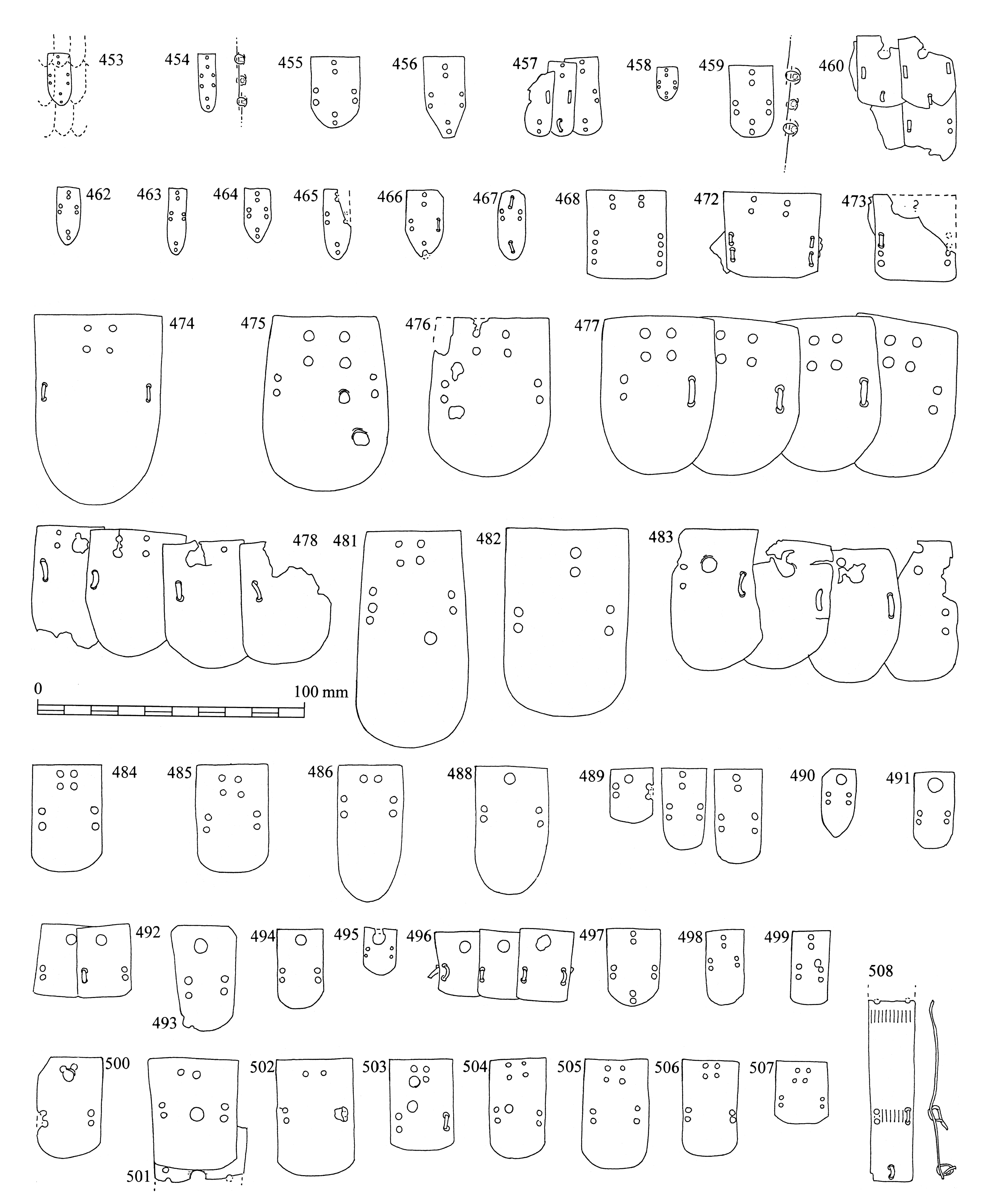


Figure 82 Drawings of armour scales **453** to **460**, **462** to **468**, **472** to **478**, **481** to **486**, and **488** to **508**. All copper alloy, except **474** to **488** which are iron.

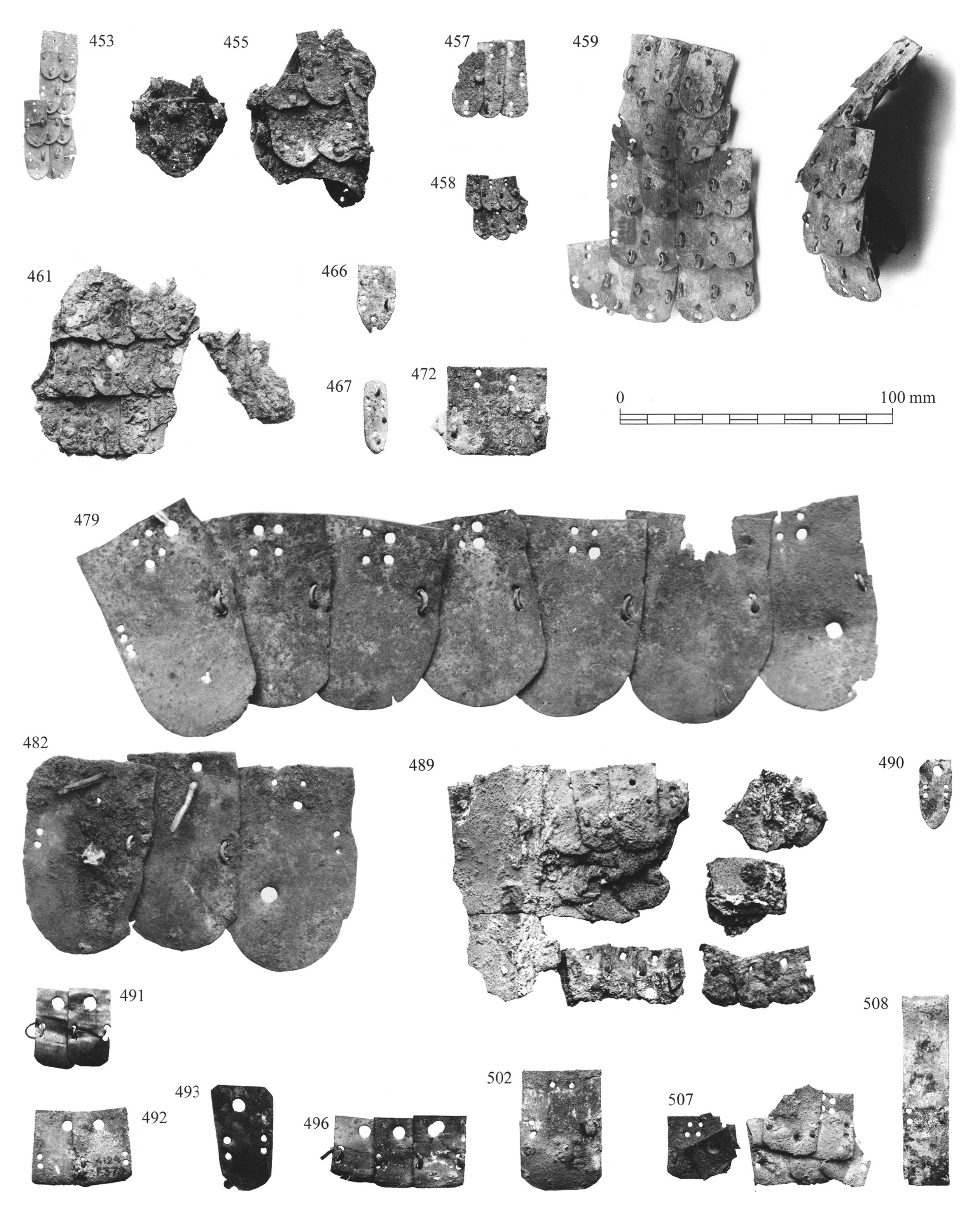


Figure 83 Photographs of a selection of armour scales: **453**, **455**, **457** to **459**, **461**, **466**, **467**, **472**, **479**, **482** (part of), **489** to **493**, **496**, **502**, **507** and **508**. All copper alloy, except **479** and **482** which are iron.

482

Two rows of large iron scales (Figs 82 and 83)
Provenance unknown
Yale no. 1933.712
Dura no. unknown
Height 70 mm, width 45–50 mm

Fused into two rows, one of three (illustrated) and one of five scales. These scales are unusual in having only a vertical pair of lace-holes at the top, rather than the usual square of four.

483

A row of large iron scales
Provenance unknown
Yale no. 1938.5999.1151
Dura no. unknown
Height 48–53 mm, width 35 mm

A row of four scales with copper alloy staples, two having only a vertical pair of lace holes at the top, the other two having a single large hole probably for an edging. This is probably from the upper edge of a defence, most likely horse armour.

484

Two rows of iron scales
Provenance unknown
Yale no. 1930.594 (part of)
Dura no. unknown
Height 40 mm, width 25 mm

Scales with the common side staples (except the staples are also iron) and a square of stitching holes at the top.

485

Iron scales
Provenance unknown
Yale no. 1938.5999.1018
Dura no. unknown
Height 40 mm, width 26 mm

A group of scales, some heavily oxidized and fused. One has a larger aperture for an edging lace.

486

A row of iron scales
Provenance unknown
Yale no. 1938.5999.1019
Dura no. unknown
Height 51 mm, width 25 mm

A row of seven whole and fragmentary scales, unusual in that the single pair of stitching holes at the top is horizontal.

487

A pair of iron scales (not illustrated)
Provenance unknown
Yale no. 1938.5999.1020
Dura no. unknown
Dimensions not measured

A pair of scales similar to **486**.

488

A pair of iron scales
Provenance unknown
Yale no. 1938.5999.1021
Dura no. unknown
Height 48 mm, width 27 mm

A pair of scales similar to **486**, except that there is only a single large lacing aperture at the top.

489

A group of copper alloy scales
Provenance unknown
Yale no. 1938.4140
Dura no. unknown

A group of fragments of heavily oxidized scales of three different sizes, mostly with standard side staples and a vertical pair of stitching holes, although some have a single upper lace hole. This is a very important piece as at least one of the fragments includes two sizes of scale (both 16–18 mm wide, but some 23–30 mm, others 36 mm high), suggesting that garments did not necessarily consist of scales of uniform size. Those with a single lace hole are the smallest size, at *c.*20 mm high, and are probably from the upper edge, perhaps suggesting that the scales were shortest in the upper rows, and longest in the lower. Possibly part of a shirt like **415**.

490

Copper alloy scale (Figs 82 and 83)
Provenance: J7-D1
Yale no. 1938.4127
Dura no. F1228
Height 26 mm, width 12 mm

A scale with a long parabolic lower edge, standard side staple holes and a single upper lacing hole.

491

Copper alloy scales (Figs 82 and 83)
Provenance: G1-36
Yale no. 1932.1403 (part of)
Dura no. E565
Height 29 mm, width 15 mm

Two corroded rows of scales with standard staple holes and single upper lacing apertures, with unattached cloth fragments.

Similar in form to scales found at Newstead (Curle 1911, 158–9, fig. 12, pl. XXIV).

492

Two copper alloy scales (Figs 82 and 83)
Provenance unknown
Yale no. 1938.4124
Dura no. F379
Height 27 mm, width 20 mm

A pair of scales similar in basic form to **490**.

493

Copper alloy scale (Figs 82 and 83)
Provenance unknown
Yale no. 1938.3981
Dura no. unknown
Height 40 mm, width 25 mm

A scale similar in basic form to **490**. Though its left edge is angled, perhaps to accommodate an angle edge to the armour.

494

Copper alloy scales
Provenance unknown
Yale numbers below
Dura no. unknown
Height 30 mm, width 17 mm

The contents of 'box I' at Yale, these scales are identical in size and shape to those of cuisses **443** and **444**, differing only in having single lace holes at the top instead of the vertical pair of stitching holes. These do not appear to belong to the cuisses, because despite the survival of substantial parts of the garments, including a lot of edging, no scales of this type are present. Yale numbers are as follows (with numbers of scales in each row in brackets):

1938.4082 (1) 1938.4087 (2)
1938.4083 (1) 1938.4088 (1)
1938.4084 (2) 1938.4089 (1)
1938.4085 (2) 1938.4090 (3)

495

Copper alloy scale
Provenance unknown
Yale no. 1938.5999.1022
Dura no. unknown
Height 18 mm, width 12 mm

A single scale with a single upper lace hole.

496

Three copper alloy scales (Figs 82 and 83)
Provenance unknown
Yale no. 1938.4119
Dura no. unknown
Height 24–7 mm, width 18–19 mm

A row of three squarish scales similar to **492**.

497

Copper alloy scale
Provenance unknown
Yale no. 1938.4137 (part of)
Dura no. unknown
Height 26 mm, width 20 mm

A single scale with a vertical pair of stitching holes at the top.

498

Copper alloy scale
Provenance unknown
Yale no. 1938.4086
Dura no. unknown
Height 28 mm, width 14 mm

A single scale with a vertical pair of stitching holes at the top.

499

Group of copper alloy scales
Provenance unknown
Yale numbers 1938.4056 (3 scales), 1938.5999.2852(1) and 1938.5999.2853(2)
Dura no. unknown
Height 28 mm, width 14 mm

Scales with a vertical pair of stitching holes at the top.

500

Copper alloy scale
Provenance unknown
Yale no. 1938.3773
Dura no. unknown
Height 38 mm, width 23 mm

A single scale with a horizontal pair of stitching holes at the top, damaged by a larger lace hole.

501

Two copper alloy scales
Provenance unknown
Yale no. 1938.4094
Dura no. unknown
Height 42 mm, width 32 mm

Scales with a horizontal pair of stitching holes at the top and larger lace holes in the centre.

502

Copper alloy scale (Figs 82 and 83)
Provenance unknown
Yale no. 1938.4103
Dura no. unknown
Height 42 mm, width 28 mm

A single scale with a horizontal pair of stitching holes at the top. Scales of this form have been found at Lauriacum (*RLÖ* XIV, fig. 30, no. 2) and Volubilis (Boube-Piccot 1994, no. 21).

503

Copper alloy scale
Provenance unknown
Yale no. 1933.363
Dura no. unknown
Height 34 mm, width 23 mm

A single scale with a square of four stitching holes at the top, one of the holes enlarged to take a lace.

504

Copper alloy scales
Provenance unknown
Yale nos 1938.5999.1023 and 1938.5999.1024
Dura no. unknown
Height 38 mm, width 20 mm

A single scale and a pair corroded together, with standard side staple holes and a group of four stitching holes at the top. The single scale has an additional lace hole.

505

Copper alloy scales
Provenance unknown
Yale numbers below
Dura no. unknown
Height 41 mm, width 25 mm

A group of scales all apparently from the same garment, including (with numbers of scales in brackets):

1938.3994 (3)
1938.4028 (12)
1938.4029 (10)
1938.4035 (2, plus 3 loose ones)

The following in 'box C and D' also appear to belong to this group:

1938.3753
1938.3756
1938.3762
1938.3764
1938.4113

506

Copper alloy scale
Provenance unknown
Yale no. 1938.4042
Dura no. unknown
Height 36 mm, width 20 mm

A single scale of similar pattern to **505**.

507

Copper alloy scales (Figs 82 and 83)
Provenance unknown
Yale no. 1938.4139
Dura no. unknown
Height 29 mm, width 20 mm

Two small groups of scales, corroded together, mostly with four holes at the top but one with a single large lace hole.

508

Copper alloy plate, probably from scale armour (Figs 82 and 83)
Provenance unknown
Yale no. 1938.4125
Dura no. unknown
Length 68 mm+, width 16.5 mm

A thin copper alloy plate with three double apertures, two of which still contain twisted wire staples, whose general form appears to be related to scale armour.

The piece is not complete but appears to have been torn across two other staple holes suggesting that the other end was a mirror image of the intact end, i.e. with a total of six staples. The purpose of the piece is not clear, but one possibility is that it is a shoulder plate from a scale shirt. It has never been clear what form scale shirts took around the shoulder and this may be one answer. Another explanation is that it could be from lamellar-like 'splint armour' for the torso of a cavalryman, such as may be depicted on the '*clibanarius* graffito' (Fig. 23).

Parallels are hard to find, but it appears to be related to a piece from Zeugma (Kennedy with Bishop 1998, 137, fig. 8.14).

509

Copper alloy scales (not illustrated)
Provenance unknown
Yale no. 1931.599 (part of)
Dura no. unknown

Five scales like those used in the accessory to Horse Armour I (**449**), but found during an earlier season.

510

Copper alloy scales (not illustrated)
Provenance: J7-C2
Yale no. 1938.4114
Dura no. F1253

Two scales of the same type as those used in the accessory to Horse Armour I (**449**), but found elsewhere.

511

Copper alloy scales (not illustrated)
Provenance: M8-W3
Yale no. 1938.4118
Dura no. F930

Two scales of the same type as those used in the accessory to Horse Armour I (**449**), but found elsewhere.

Edged weapons

The category of 'edged weapons' includes swords and daggers, together with their scabbards. Roman swords were carried on shoulder-belts (baldrics), which were probably permanent attachments and considered an integral part of the weapon. Daggers were attached to waist-belts. However, belts are discussed separately because they are mostly represented by their metal fittings, and the substantial pool of such items is discussed collectively elsewhere (pp. 61–2).

The pieces represent dozens of weapons; the maximum number, which is probably close to the actual figure, is around seventy-five. Most are represented by scabbard fittings found loose, consisting of chapes (scabbard tips) in iron, copper alloy, bone or ivory (**553**–**584**), and slides (for attaching the sword to the belt) in copper alloy or bone (**533**–**552**). There are also some fragments of decorative openwork plates from dagger scabbards (**585**–**588**). The blades themselves are less well represented. Only twelve whole or fragmentary examples have been catalogued (**512**–**523**). A number of hilt fittings were also found separately (**524**–**532**).

Among the sword and scabbard fittings, the preserved proportions of materials used in manufacture will not, of course, reflect the original ratios. Copper alloy will be over-represented in relation to iron by virtue of its greater resistance to decay, and perhaps in relation to bone and ivory due to its superior visibility during excavation. It is also worth bearing in mind the possibility of the use of wooden fittings on the Dura scabbards. The all-wood hilt assemblies of blades **513** and **514** are only known from the preservation of wood grain in the corrosion products on the tangs. The use of wood for their chapes and slides might explain the lack of associated metal or bone fittings. Wooden slides appear on some of the scabbards from Nydam (Engelhardt 1865, pl. VIII:26–7). However, the associations of blade **513** are not certainly known, and it is quite feasible that its fittings were separated during excavation. The same possibility applies to blade **514**.

The whole blades and, where they are large enough to be identified, the fragments are mostly of the common Roman two-edged longsword type, the *spatha*. No evidence was found at Dura of the *gladius*. This traditional sidearm of the legionary, originally primarily a stabbing weapon, seems to have been gradually going out of use from the second century onwards, as it was progressively replaced by the rather longer *spatha*, principally a slashing sword (Oldenstein 1976, 106; Bishop and Coulston 1993, 126). Legionaries are depicted with *spathae* from the time of Severus if not before (Oldenstein 1976, figs 13–14; Speidel 1976, 26–30, pls 2–3).

There is evidence for a range of shapes and sizes of slashing sword in third-century Roman Europe. For example, Künzing has yielded some short swords with parallel-edged or triangular blades which are not like *gladii*; some are perhaps fashioned from broken *spathae* (Schönberger and Herrmann 1968, 59, fig. 20; Bishop and Coulston 1993, 126, 130). Some such short light blades may have been called *semispathae* (Vegetius 2.15). However, no such weapons were observed in the Dura assemblage. Likewise Dura has produced no recognizable example of the *Ringknaufschwert*, a type of longsword with a characteristic all-iron hilt assembly consisting of a cross-guard and a ring-shaped pommel, which was fairly common in continental Europe during the later second century AD (Hundt 1952, 1955; Raddatz 1961; Kellner 1966; Biborski 1994b). They were certainly used in Syria: unpublished fragments from such weapons are on display in the National Museum, Damascus.

Almost all of the chapes (**553**–**582**) are of types known or suspected to belong to *spathae*. Chape **564** was still attached to one when found (blade **512**), while disc chapes such as **566**–**575** are to be seen on *spathae* in a number of depictions of Roman soldiers (e.g. Fig. 24:A to C, and E). The complete *spatha* and scabbard from the Khisfine cemetery in Syria had a disc chape (Trousdale 1975, 236, no. 51, pls 18d, 19a–b; Gogräfe and Chehadé 1999, 74–7, fig. 2). A parabolic chape like **576** was found on the Lyons *spatha* (Wuilleumier 1950, fig. 1).

No examples of *gladii* with scabbard slides are known to me; they seem to be confined to *spathae*. There is no certain association between any of the slides and the blades from Dura, but a slide identical to **533** was found on the Lyons weapon, and that on the Khisfine sword was very similar to slide **551**. Other types of sword include a Hellenistic *machaira* or *kopis* (**523**), and two fragments of weapons of unidentified form. The latter include a copper alloy hilt guard and jade disc pommel (**529** and **532**). The pommel is all that remains of the sword found beside the 'Persian' skeleton in the Tower 19 countermine.

Other weapons represented include a dagger of *pugio* type (**522**), three other military daggers attested by fragments of openwork scabbard plates (**585**–**588**) and probably three further daggers, possibly of military pattern (on the basis of scabbard chapes **583** and **584** and hilt fitting **528**).

Blades

The complete and fragmentary *spatha* blades are, in most respects, closely similar to weapons found in Roman Europe. (See catalogue for parallels. Much of the best-preserved Roman material has been found beyond the northern frontiers: Biborski 1994a; Rald 1994. For work on the metallography of Roman swords, see Lang 1988.) Surface indications suggest that blade **512** may have been pattern-welded, a technique commonly used for the manufacture of Roman swords in the middle empire (Rosenqvist 1968; Ypey 1982; Bishop and Coulston 1993, 190), although it may have been fullered (Webster 1982). There is no clue to the structure of the other blades in the absence of X-rays which might also reveal makers' stamps or inlaid marks such as are found on Western examples (Engelhardt 1865, pl. VII; Rosenqvist 1968; Keim and Klumbach 1951, 37, no. 43, pl. 42).

The *spatha* blades are of lenticular section and range in width from 40 to 60 mm. The three measurable examples (blades **512**–**514**) all exhibit the some basic geometry. The middle section of the blade is virtually parallel-edged, but tapers into a rounded point of almost parabolic outline. It also flares outwards slightly towards the shoulders. A fairly consistent feature, this may be the result of repeated sharpening, or to adjustments in the balance of the blade after attachment of the hilt. However, the preferred explanation is that it simply served to ensure that the blade sat firmly in the scabbard without rattling.

Each blade has the typical long tang of Roman swords, designed to take not only the grip but a deep guard and large subspherical pommel, traces of which are to be seen on the tangs of blades **513** and **514**. Hilt fittings **524**–**527**, **530** and **531** come from these characteristic assemblies, which were used both on the *spatha* and the earlier *gladius*.

With regard to daggers, the fact that only one reasonably certain fragment of a *pugio* blade (**522**) was found at Dura may suggest that these weapons were also going out of use by the mid-third century. No examples of the characteristic copper alloy-framed scabbards were found either. These weapons were still in circulation in the West at about this time (Schönberger and Herrmann 1968; Herrmann 1969), and there is some indication that new variants were still appearing. For example, some such daggers had sheaths with a chape instead of a frame (e.g. at Mainhardt, *ORL* B no. 43, II, no. 1, fig. 3:7). It is possible that the small chapes **583** and **584** are from *pugiones*, but this is quite uncertain and they could be plain daggers of other patterns. Hilt fitting **528** is from a wide but thin-bladed weapon which may have been a variant type of *pugio*.

There are a couple of notably anomalous items within the assemblage. The copper alloy hilt guard with back-turned quillons (**529**) is problematical, not least because it is in Damascus and so is only known to me through a photograph and a site sketch. Probably from a sword, it was made to take a blade of 60 mm width at the shoulder. Its swept quillons vaguely suggest a weapon like the much later scimitar, but the resemblance may be superficial.

Blade **523** is part of a single-edged slashing sword of a type known in antiquity as a *machaira* or *kopis*. These weapons were in widespread use during the Hellenistic period, but were obsolete by the first century AD. The presence of an example in the Dura collection may be explained in a number of ways. It may be an heirloom of one of the Durene families of Macedonian origin who jealously preserved their identity down to the Roman period. It could have been an old weapon from the city armoury (survival of weapons in these circumstances is quite possible, as parallel cases of arms surviving for centuries in storage are known from medieval Europe). The most likely explanation is that it was actually excavated from a Hellenistic context which was not recognized as such.

The *spatha*, then, was the dominant sword type in use at Dura at the time of the siege. It was a slashing weapon, but was very unlike later medieval European broadswords, which were usually well balanced, with a heavy metal pommel and a carefully tapering blade. They were generally not particularly heavy, and so could be effectively manoeuvred by hand and wrist. The *spatha* had very different characteristics. It lacked a heavy pommel, while the blade was of fairly constant section except for the last 150 mm or so. The result was an unbalanced weapon with a lot of weight near the tip, which could not easily be wielded about the wrist without the risk of injury to the arm. Perhaps the heaviest examples were wielded at arm's length for the most part, like a one-handed axe. The Dura blades are apparently amongst the most massive *spathae* known, several measuring 10–12 mm thick down the central axis; such weapons would have been more like sharpened clubs than weapons suitable for complex fencing. (A mace-head was also recovered from Dura, **647**.) However, it seems very likely that this apparent extreme thickness is a result of intense oxidation; the soil conditions at Dura are very hostile to iron, and the blades appear to have swollen and split due to deep corrosion. Whether they were actually relatively heavy blades is now hard to prove. One independent check is the size of tang apertures on the surviving hilt guards from *spathae*, which being copper alloy still preserve their original dimensions more or less intact; these, **524** to **527**, do not differ in this detail from European examples.

Spatha blades at Dura certainly varied considerably in dimensions, and therefore weight. They were perhaps tailored to individuals and to types of fighting, being matched to the stature and length of arm of infantrymen, with generally longer weapons for horsemen. Strength and personal preference in fighting technique may also have been factors in choice of length and weight.

Blades **512** and **513** are very long, suggesting they are primarily cavalry weapons. Here delicate fencing was redundant, as being on horseback hindered free movement. The long, heavy *spatha* was an appropriate weapon, allowing maximum reach and, when swung at arm's length, maximum impetus behind the blow. Even if it did not cleave through the opponent's armour, the blade may well have had sufficient kinetic energy to cause severe injury or to knock him off his mount. It is now clear that contemporary saddles, both Roman and Sasanian, provided a very firm seat despite the absence of stirrups, permitting riders to put maximum impetus into a blow without fear of unseating themselves (pp. 67–9).

Hilt fittings

The hilt fittings are also mainly from the characteristic tripartite hilt assemblies of Roman swords. While these assemblies all consisted of the same structural elements, the materials used varied from sword to sword. Blades **513** and **514** had hilts entirely of wood. Fittings **524**–**527** show that a number of swords had metal plates to reinforce the vulnerable undersides of the guards, which in these cases were probably of wood. The plates have pierced decoration around the edge. The Dura evidence suggests that at this period most *spatha* hilt assemblies were made of wooden components, and that their apparent rarity in the record is a result of their poor survival potential (although wooden components are known from waterlogged contexts at Vindonissa and elsewhere, e.g. Fellmann 1966).

Apart from traces adhering to hilts, a single grip from a *spatha* has been recognized (**530**). It is of bone, of subsquare section with a pattern of teardrop-shaped projections on its surface for decoration and grip, very different from the faceted forms of the first century AD.

The crystal pommel (**531**) is almost certainly from a Roman *spatha*, as it was found amidst the bodies of Roman soldiers in

the Tower 19 countermine (*Rep*. VI, 195, 204), and it has the onion shape characteristic of many Roman hilts. Whether it came from one of the known blades is unclear (see the discussion in the catalogue). However, pommels of such showy materials are not known in the West. They do appear outside the empire, in central and eastern Asia (e.g. Trousdale 1975, 104, 111, fig. 91), though these examples are of discoidal form (see also the apparently Persian jade disk pommel from the Tower 19 mine, **532**). The crystal may therefore perhaps come from a *spatha* showing some oriental influence.

The bone grip and the crystal pommel show how ornate these weapons could be, an impression emphasized by the all-ivory scabbard and fittings of the *spatha* from Khisfine, Syria (Trousdale 1975, 236, no. 51; Gogräfe and Chehadé 1999, 74–7, figs 2–5). With the exception of the pommel, all the above details of hilt construction would be quite at home on *spathae* from European sites, and suggest that the variety of styles at Dura was as extensive as that in the West, if not greater.

There remain the fittings which do not belong to *spathae*. Of these, the most important is the jade disc pommel (**532**). It is fairly certain that this is from a weapon of oriental type, as its only parallels are Asian (Trousdale 1975, 104, 111, fig. 91) and it was found beside the so-called Persian skeleton in the Tower 19 mine, with the fragments of a longsword too corroded to be recovered (*Rep*. VI, 194). Whether it was Sasanian in the strict sense is unknown, but there is at least one Sasanian relief at Bishapur which may portray a similar hilt (Herrmann 1981, pl. 5). The jade itself was certainly imported from Chinese Turkestan (*Rep*. VI, 194).

The bone guard **528** has already been discussed. It is from a dagger, possibly a *pugio* variant.

Scabbards and scabbard fittings

No intact sword scabbards were found at Dura. However, blades **512** and **513** had been sheathed at burial and traces of their scabbards survive. In the case of blade **513**, only the wood of the sheath itself is to be seen, but blade **512** also had a bone chape (**564**) attached when found. None of the other scabbard fittings are associated with any of the recovered blades.

The scabbard fittings consist of protective tips (chapes) and bridge-mounts, more commonly called scabbard slides, through which passed the suspension belt. These components were of bone, ivory and copper alloy. Some chapes were of iron. As discussed above, the existence of wooden versions is also likely.

Belt attachment by slide came into use in the Roman empire in the second century AD (Waurick 1989, especially 51), displacing the earlier system of metal rings attached to a copper alloy frame around the sides of the scabbard used on *gladii* (Ulbert 1969b) and early *spathae* (Berciu 1981, pl. 62; 1982). The new method of sword suspension appears on representations of Roman soldiers from the later second century onwards (Oldenstein 1976, 104, 228). Slides and associated chapes (especially of peltate form) were known from Antonine, possibly even from Hadrianic, times, probably entering Roman usage from beyond the Danube (Bishop and Coulston 1993, 112); the earliest depictions of scabbard slides on a Roman monument known to me are on the base of Trajan's Column, probably representing captured Sarmatian or Dacian arms (Trousdale 1975, fig. 88).

The scabbard slide was attached to the front of the sheath, and the belt was passed through it. This meant that the sword was hung between the body and the belt, helping to reduce the load placed on the slide itself. The belt was not a waist-belt but a baldric passed over the shoulder (p. 62).

Relatively little is known about the structure of the sheath itself, although what evidence there is suggests that it was usually made of wood (traces on blades **512**–**515**, **517**). A sword with a scabbard of solid ivory is known from a cemetery site in Syria (Trousdale 1975, 236, no. 5.1, pls 18d, 19a–b), but nothing like it was found at Dura. Only **513** is sufficiently well preserved to make it possible to reconstruct the sheath (Fig. 85). The basic structure seems to have consisted of a thin lath of knotty wood on each face of the blade. How the laths were held together is uncertain, but the answer may lie in the traces of textile found adhering to the surface of the wood at a number of points. It may be that the sheathed sword had been wrapped in textile, e.g. a cloak, at burial. However, the threads in the cloth share a consistent alignment, and so may be structural. The scabbard may have been made by placing two shaped wooden slats against the greased surfaces of the blade, then tightly winding the whole with a spiral strip of glue-soaked cloth. The fabric would contract on drying, forming a lightweight, perfectly fitting sheath to which the slide and chape could be added. Alternatively, an all-wood assembly, including slide and chape, is also possible (see below). Both reconstructions are illustrated with **513**.

Other scabbards had different structures. At least one chape still contains the end of a leather-bound sheath (**567**). Representations from elsewhere suggest that some kind of light edge-binding was used, perhaps of copper alloy channelling. No evidence was found for such edge-bindings at Dura, so it may be assumed that they were no longer in use. A median spine is also often to be seen (chapes **553**–**559**, **561**–**562**, **565**, **576**–**578** and **581**). Evidence from the late Roman period in Denmark shows that at least in Europe scabbards could be of plain, presumably polished wood; the longitudinal strip-features were carved integrally (Engelhardt 1869, 16, pl. 6:10 and 13). Slide **550** has a groove down the back to accommodate a median ridge, proving that they were present on scabbards at Dura too.

Scabbard slides

Wood may have been used for the manufacture of scabbard slides, but the surviving examples from Dura are of copper alloy and bone. Iron slides are well known from third-century contexts in Germany (Hundt 1960; Oldenstein 1976, nos 66–100), and were found in the Danish bog-deposits (Engelhardt 1869, pls 6:10, 7:35–7). These were thought to be a type specific to Germany (Oldenstein 1976, 106–8), but at least three examples have been found in Britain (Canterbury: Webster 1982, fig. 100:d; Caerleon: Nash-Williams 1932, 74, fig. 24:f; Vindolanda: Jackson 1985, 132, fig. 47:5). Their apparent absence from Dura may be due to restriction of their distribution to Europe. However, since iron chapes are common enough at the site, it is suspected that they were in fact present, but that corrosion has destroyed many and rendered any surviving fragments hard to identify.

The most common surviving Durene slide type, a copper alloy form represented by slides **533**–**543**, is widely known in the West (Oldenstein 1976, nos 34, 40–4, etc.; Nash-Williams

1932, fig. 36:2–11; Wuilleumier 1950, fig. 2), but Dura lacks the other common European type which has an upper terminal in the form of a ring or closed *lunula* (Oldenstein 1976, nos 55–7; Webster 1971, nos 82–3). The apparent absence of this type could be due to the chances of preservation; the assemblage is hardly large enough to rule this out statistically. However, the Dura assemblage resembles the European background in having a few basic types and some more individualistic pieces.

The attachment of the slide to the sheath is problematical. The forces which it had to resist did not tend to pull it away from the blade; being on the outside, its main function was to stop the baldric sliding up the scabbard. For this reason, slides **533**–**542** had fastening pins which penetrated the wood of the scabbard. (For an iron example *in situ* on a scabbard from Nydam, see Hundt 1960, fig. 7.) On European copper alloy examples these studs were usually just integral projections of the basic casting (Oldenstein 1976, 105, figs 12–14). The Dura examples had stronger iron pins set in them, but it seems unlikely that these alone were sufficiently strong to hold the weight of the weapon, especially if the wood of the scabbard split along the grain. It seems very likely that some kind of additional binding was required. On the common copper alloy examples such as **533**–**542** this would run over the upper terminal and over the lower end between the bridge and the bottom terminal. This is suggested in Oldenstein's reconstruction (1976, figs 11–12). Traces of iron corrosion at the base of the upper terminal of slide **539** suggests that in that particular case iron wire was used. The binding of the lower end in the manner described would also explain the way in which slides **534**–**542** were broken; wrenching off the baldric (perhaps during combat or, more likely, during the looting of bodies) would snap the slide at its weakest point, just above or below the lower end of the bridge, leaving the lower terminal still attached to the scabbard.

Slides **546**–**551** lack securing pins. **547** and **550** can only have been affixed by some kind of binding around the scabbard, whilst **549** and **551** have special apertures for cords or wires. The latter pair of bone slides also have projecting tongues at top and bottom, which presumably were somehow slipped into the structure of the scabbard itself. It has been suggested that they were slipped under a leather covering to the sheath (Trousdale 1975), or that they were glued to the wood (Oldenstein 1976, 101), but it is equally likely that they were secured under the median ridge, however that was attached to the scabbard (see the examples worn on the scabbards of the Tetrarchs in Venice, identical to **549**; Delbrück 1932, pls 31–2). This method of attachment must have been strong, as slide **548** had no apertures for cords, but relied on the tongues alone. **545** had both tongues and iron locating pins.

Scabbard chapes

The chape was attached, usually by riveting, to the tip of the scabbard. Except for some obscured by corrosion or only partly preserved, all chapes still possess rivets, empty rivet holes or decorative apertures through which rivets could be passed (as seen on examples from Denmark: Engelhardt 1869, pl. 9:203, 208). Glue may also have been used, while copper alloy chapes could have been securely attached without recourse to either means. Provided that they were made to fit tightly, they could be annealed, slipped into position and hammered, simultaneously hardening the metal and giving them a firm purchase.

The variety in the size of the blade aperture reflects the shape of the tip of the weapon rather than its overall dimensions, so that a small chape does not necessarily belong to a short, light sword. There are insufficient known associations between blades and chapes to make such statements.

The three basic types of chape preserved at Dura, the peltate (**553**–**565**), discoidal (**566**–**575**) and parabolic forms (**576**–**578**) are all common in the West. However, the commonest of all the European types is completely absent. This is the bone box chape, a squarish form which flares slightly towards the bottom. It usually has median and edge ridges and peltate apertures (Oldenstein 1976, pls 25–7). The closest example at Dura is the iron and copper alloy **582**. There seem to be enough chapes from the site for the absence of this form to be more than chance. Seven of the thirty *spatha* chapes are of bone or ivory, proving that conditions were conducive to their survival, so it seems probable that the box type was not in use at Dura at the time of the siege.

At least one of the iron disc chapes from Dura has copper alloy inlaid decoration on its surface (**566**), like examples from Germany (Hundt 1953). The appearance of such chapes at Dura is interesting as it was thought that they were largely confined to Germany (they are virtually absent from Britain, for instance).

The original proportions of chapes of bone, ivory, copper alloy and iron cannot be recovered, but it is reasonable to suggest that there was a far higher proportion of iron examples than now appears to be the case. The possibility of the use of wood for making chapes was raised above.

Dagger scabbard plates

A handful of pierced copper alloy objects have been identified as belonging to elaborate dagger scabbards of a type well known in Europe (**585**–**588**).

Edged weapons at Dura

The only items not readily identifiable as known Roman types are the 'scimitar' hilt (**529**), the *kopis* blade (**523**) and the jade pommel **532**. Hilt component **529** remains enigmatic, while blade **523** is a relic of earlier times, and may be regarded as an heirloom or residual. Pommel **532**, coming from the sword associated with the 'Persian' skeleton, may be presumed to belong to the sword of one of the attackers. It is unfortunate that none of the fragments of the blade with which it was found can be identified, but as it stands, little more can be said about the edged weapons of the besiegers.

The Roman sword material is dominated by remains from long slashing swords, or *spathae*. There is no sign at all of the earlier *gladius*, which was obsolete by the third century. The apparent presence of a single *pugio* fragment is again not surprising; they were still known, but apparently also becoming obsolescent, in contemporary Europe.

Considering the rest as an essentially Roman assemblage, it fits very well with what is known of the comparable contemporary archaeology of the Rhenish, Danubian and British *limites*. The differences are subtle, and matters of detail. Others may be more apparent than real; the perceived absence

of *Ringknaufschwerter* could be due to the poor preservation of much of the iron at the site, although it is more likely that such swords were no longer in use by the time the Dura material was deposited.

There are a number of fairly splendid items, especially the crystal pommel (**531**). The latter is Roman in shape, but without close parallel, and could represent an orientalizing feature (perhaps copying semi-precious stone mountings like the jade piece), though Roman soldiers were quite capable of flamboyance on their own initiative. In fact, it is hard to identify much that is unequivocally orientalizing in this assemblage.

Scabbard fittings show some interesting differences. Almost all the chapes and slides would excite no comment if found in Europe, and thus are part of the standard Roman milieu. However, some forms seen in the West are absent, notably bone box chapes, ring-topped copper alloy slides and iron slides. The absence of iron slides is explicable in terms of differential preservation, or failure to identify badly corroded fragments, but the other cases are more interesting. Could it be that they were not in fashion in the East? Or that they were unit-specific, or at least tended to be associated with certain units or types of unit, and that these were absent from the site? Unfortunately even the Dura assemblage is too small to be certain that their absence is real rather than apparent, so these questions can be raised, but not answered.

Perhaps the most interesting aspect of the Dura material is the emphasis on the use of wood for hilt assemblies and perhaps for scabbard fittings; this is something that is definitely attested in the West, but it is often forgotten because of poor preservation of wood and the plethora of bone and metal pieces.

In summary, the swords from Dura comprise a good Roman assemblage with a few exotica, perhaps somewhat adapted to local conditions in the large size of some of the blades.

Catalogue: Edged weapons

Blades

512

Iron longsword with chape
Provenance: F3-2
National Museum, Damascus
Dura no. F877
Overall length 790 mm. Blade length 645 mm, width 55 mm flaring to 58 mm at the shoulders, thickness 10 mm. Tang length 145 mm, width 22 mm tapering to 11 mm.
Published in *Rep.*VI, 82–3 and pl. XXVI:2, according to Yale records this object is now in the National Museum, Damascus.

The following is based on the published account and the site record card in the Yale archives.

'From the ash fill of the hypocaust of room 2' (*Rep.* VI, 82), the blade is complete except for the tip of the tang and possibly a small piece near the point. It was broken into five pieces when found. A two-edged weapon of basically lenticular section, its cutting edges are roughly parallel. They flare slightly towards the shoulders of the blade. Towards the tip the profile tapers gently before sweeping in to the point. The tang is described as being round in section, but from the photographs appears to be so split by corrosion that this cannot be regarded as certain. It is in any case unlikely; Roman tangs are usually rectangular in section, a shape easier to forge and which prevents the grip rotating. No trace of the hilt assembly or scabbard slide survived.

A good photograph (Fig. 84: Damascus negative N128) shows grooves running the length of the blade. These are probably fullers, but could be caused by differential corrosion of the alloys in a pattern-welded sword.

It was sheathed when deposited. The Yale record card mentions 'remnants of wooden sheets' from the scabbard, but these traces are not mentioned in either the description written on site or the published account. At the time of discovery the tip of the blade was still inserted into a bone chape. The latter is discussed separately (**564**).

This is a longsword of a well-known Roman type, identified as the *spatha* of literary sources. The shape of the blade is typical of second- and third-century weapons, especially in its lenticular cross-section (rather than the earlier diamond), the form of its point and its flared shoulders. Other similar blades come from Carnuntum (*RLÖ* II, pl. XXI:9), Kastell Buch (*ORL* B67, 14, no. 2), and Pfünz (*ORL* B73, 40, no. 6, pl. XV:64). There is a fine *spatha* from Lyons which probably dates to the very end of the second century (Wuilleumier 1950; Bishop and Coulston 1993, 135).

It is generally similar in size to the two second century AD examples discovered in Canterbury (blades 655 by 59 mm and 690 by 56 mm), resembling especially the longer of the two which has the same shaped point and the slight expansion in width up to the shoulders of the blade (Webster 1982, 185, fig. 99). The latter weapon is pattern-welded, while the shorter blade is also of composite construction with two fullers on one side only. Both Canterbury examples are lenticular in section.

Roman *spathae* varied considerably in length. Two earlier *spathae* from Newstead had blades of 610 mm and 635 mm (Curle 1911, 183, and pl. XXXIV:6–7). One from Straubing has a blade of 797 mm and a tang of 143 mm (Keim and Klumbach 1951, 37, no. 43, pl. 42). Another from Wroxeter reaches 725 mm (Atkinson 1942, 218), while an example from Carnuntum has a blade as long as 840 mm, 50–5 mm wide (*RLÖ* V, 75, fig. 33:1). The late third or early fourth century *spatha* from Köln is 890 mm (Behrens 1919, 1, pl. 1). Blade **512**, then, is not especially long.

A quantity of comparable material is known from the Eastern empire, but details are sadly few. The blade of the remarkable Khisfine sword from Syria is incomplete, but Gogräfe and Chehadé estimate its original length at *c.*600 mm, excluding the tang (Gogräfe and Chehadé 1999, 74–7, figs 2–5; Trousdale 1975, 236, no. S1, pl. 19:a–b). There is also a blade from Jerusalem (Broshi 1972, 105, nos 3–4), and a *spatha* was found in a grave at Nawa (Tell Oum Hauran) in Syria (Abdul-Hak 1955, 187), but no precise description of either is available.

513

Complete longsword blade (Figs 85 and 86)
Provenance: uncertain, possibly Tower 19 countermine*
Yale no. 1938.5999.1228*
Dura no. unknown
Overall length 855 mm. Blade length 695 mm, width 48 mm flaring to 60 mm at the shoulders, thickness 9–11 mm. Tang length 160 mm, section 24 mm × 11 mm tapering to 10 × 6 mm.
* There is confusion over the identity and provenance of this blade (see below).

This was originally given the number 1933.693 in the Yale card catalogue. Its Dura number and provenance were given as 'F1333?' and 'B2 D12?' with 'Tower 19?' pencilled below. The notes say 'with glass pommel [*sic*; this is the rock crystal pommel, **531**] – Yale Gallery card gives field no. F877 to this, but that is another sword, now in Damascus.' In fact this sword cannot be either F877 or F1333. The former is certainly **512**, and F1333/1933.693 is also certainly the fragmentary sword **514** which bears labels with these numbers. Blade **513** lacks labels and cannot be certainly identified or provenanced. It could well

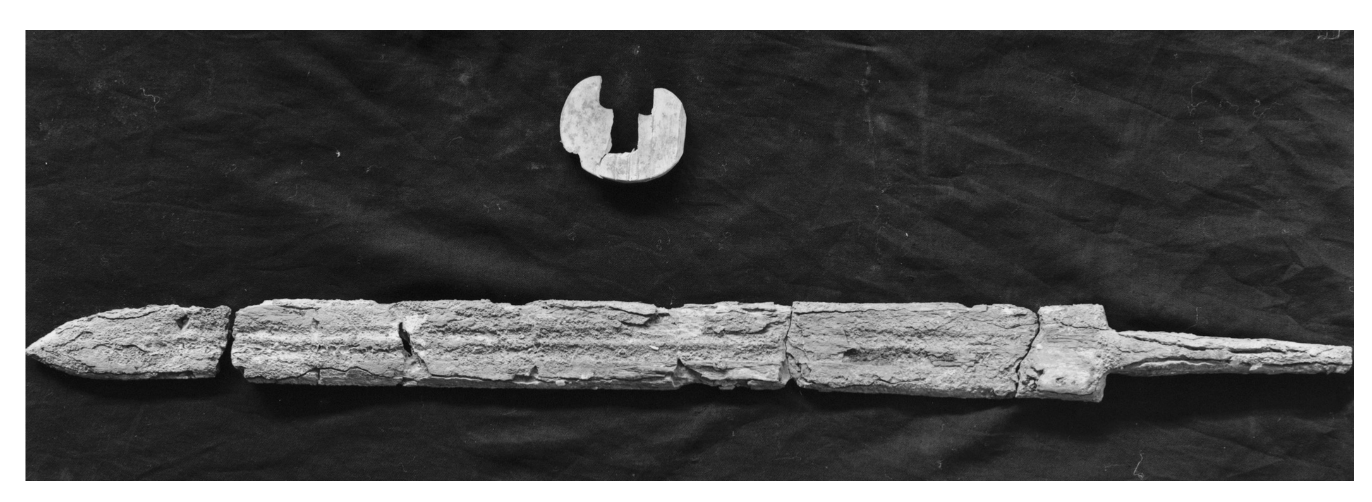


Figure 84 Sword **512** with its chape, **564**.

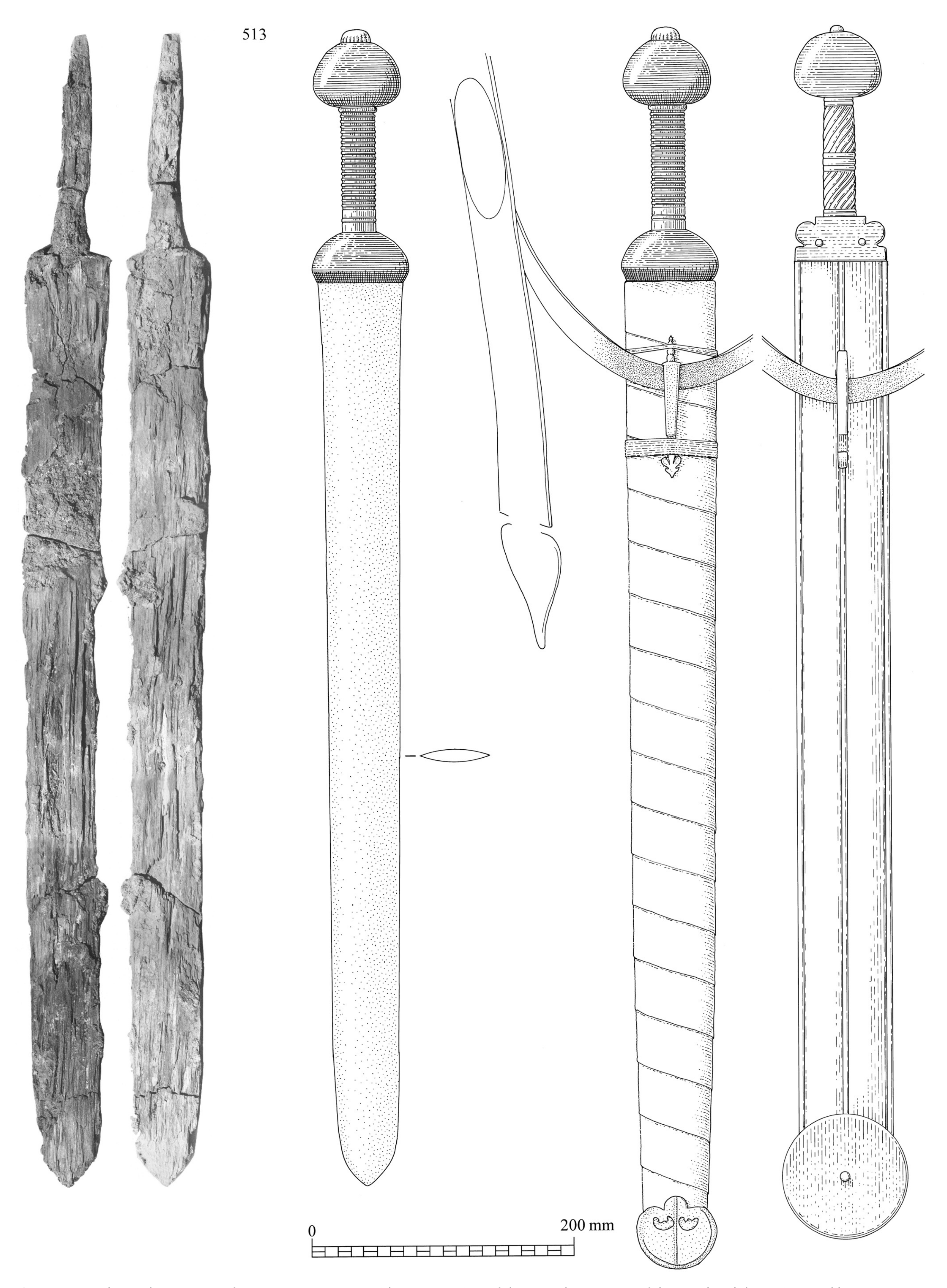


Figure 85 Sword **513**: Photomosaics of its current appearance, with reconstructions of the original appearance of the sword, and alternative possible constructions of hilt assembly and scabbard.

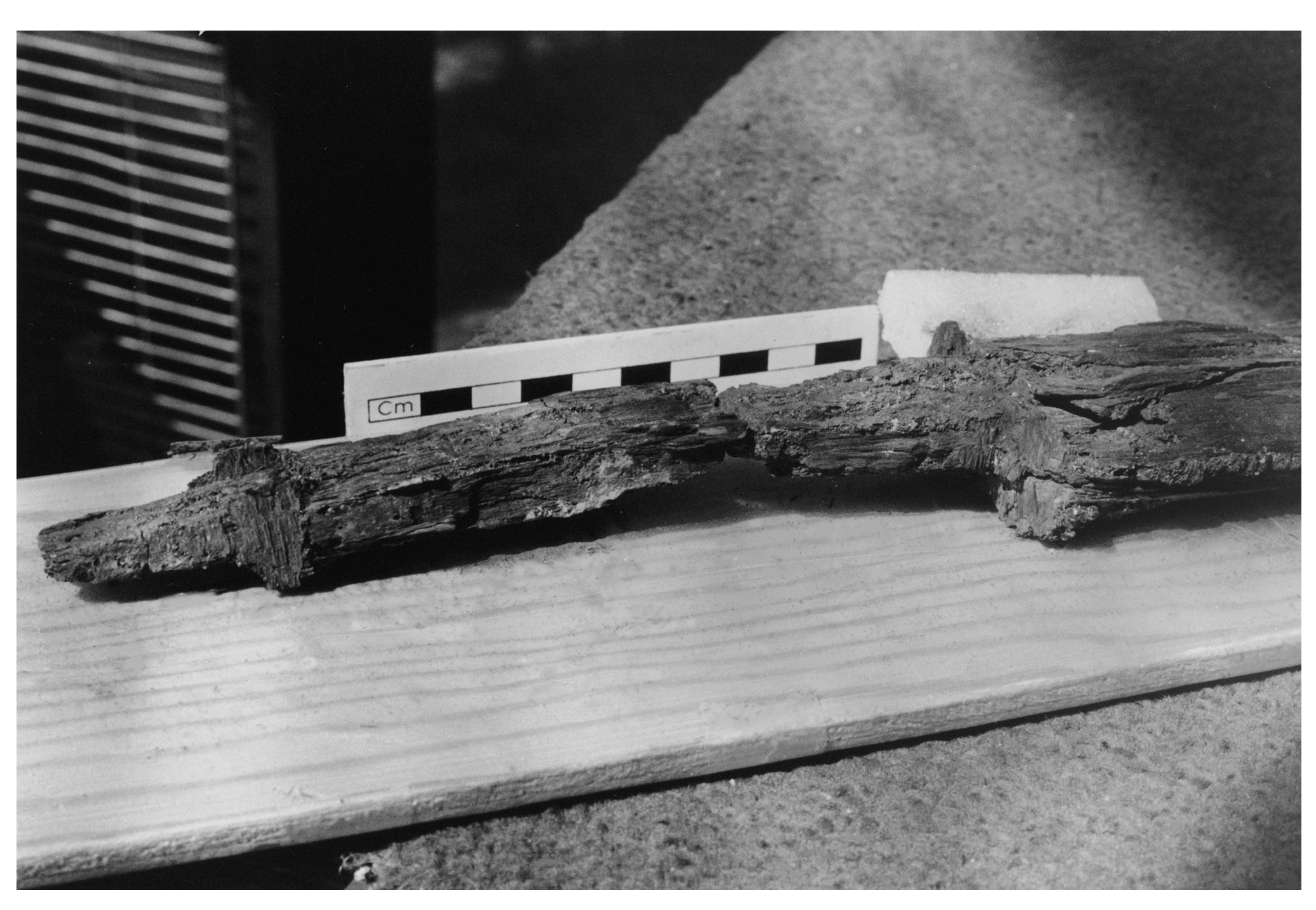


Figure 86 Sword **513**: detail of hilt showing wood grain running in different directions, from the different components of the hilt assembly, preserved in the iron corrosion products.

come from the Tower 19 countermine, where the crystal pommel was found with a 'large sword' to which it supposedly belonged (*Rep.*VI, 195, 204). However, the pommel cannot belong to **513**; it has a cylindrical aperture, while the tang of the sword is of rectangular section, too large to fit the hole, and in any case shows unequivocal evidence of a wooden pommel.

The fact that the sword was sheathed need not cast doubt on a provenance in the Tower 19 countermine, since there would have been inadequate space to wield a slashing weapon like this. Thrusting weapons are more likely, and indeed a couple of bodkin points were found in the mine, perhaps from makeshift mine-fighting weapons (*Rep.* VI, 205 no. 8, and fig. 15:D).

The blade, now in six pieces, is of the same type as **512**, lenticular in section with slightly tapering edges flaring at the shoulders and sweeping gracefully into the point. It is rather longer than **512**. There are no signs of fullers. It appears to be a very thick blade, but this is probably the result of oxidation processes. The corrosion products have preserved the grain of the wooden scabbard very well, and the hilt assembly which, likewise, was entirely of wood, although the species remain unidentified.

The hilt consisted of three pieces of wood; guard, grip and pommel. The grain of the first and last runs towards the observer when the blade is viewed flat, while that of the grip runs parallel with the tang, and passes under the grain of the sword guard. The grip was therefore rebated into the guard. This is clearly a wooden version of the characteristic tripartite hilt assembly widely known on Roman swords, especially in bone or ivory (cf. Oldenstein 1976, 89–95, pls 10–11 and refs). Other wooden examples are known, from Vindonissa (Fellmann 1966), Rheingonheim (Ulbert 1969a, 44, pl. 32:1–4), Pfünz (*ORL* B73, 25, no. 13, pl. 15:65) and Canterbury (Watson *et al.* 1982, 188). The Canterbury *spathae* had hilts and scabbards of poplar and willow. One had a guard of maple (Watson *et al.* 1982, 189).

An unusually large amount of detail relating to the scabbard survives, although its fittings (chape and slide) are missing. It is likely that they too were made of wood, and are completely lost because, unlike the hilt and scabbard, they were not in direct contact with the blade and so were not preserved by mineralization.

The scabbard was made of two thin (*c.*3 mm) sheets of knotty wood, sandwiching the blade. Traces of textile adhere to the surface of the wood grain. These are consistently orientated at a slight angle to the axis of the scabbard. It is possible that the fabric has nothing to do with the structure of the scabbard; for example, the sword may have been wrapped in a cloak or garment at burial. However, at least one other Roman sword with a fabric covering is known, although in that case it was held on by leather cross-straps (Berciu 1981, 236, pl. 62; 1982). A further structural parallel is provided by the probably sixth-century Sutton Hoo sword, which had a wooden scabbard at least partly wrapped in linen tape (Bruce-Mitford 1978, 284).

514
Fragmentary longsword blade

Provenance: B2-D12
Yale no. 1933.693 and 694a and c
Dura no. F1333, F1321 and F1355a
Overall length *c.*830 mm (estimated). Blade length 650 mm (estimated), width 40 mm flaring to 47 mm at the shoulders, thickness 14 mm. Tang length *c.*180 mm (estimated), width 25 mm tapering to 10 mm.

Two large pieces of a *spatha* are labelled 1933.693/F1333. One is the near end of the blade including the base of the tang. The other does not join, but is clearly part of the same blade as its dimensions and corrosion patterns match. These fragments preserve at least 470 mm of blade and 31 mm of tang. A separate iron tang labelled 1933.694/F1321 also seems to be from this weapon. Again, there is no direct join, but the dimensions and surface indications make the match fairly certain. In the site-register, F1321/1933.694 is described as 'coin, needle' and the provenance as B2-D11. Clearly there is an error here. Several other fragments of swords are labelled 1933.694, so for convenience and clarity the tang is here called 1933.694c.

Rather clearer is the association of the blade tip, F1355a/1933.694 (called 1933.694a here). The provenance in the site-register is B2-D12 (identical to the major fragments 1933.693) and the description is 'fragments of iron sword'. Found in the same room, this tip almost

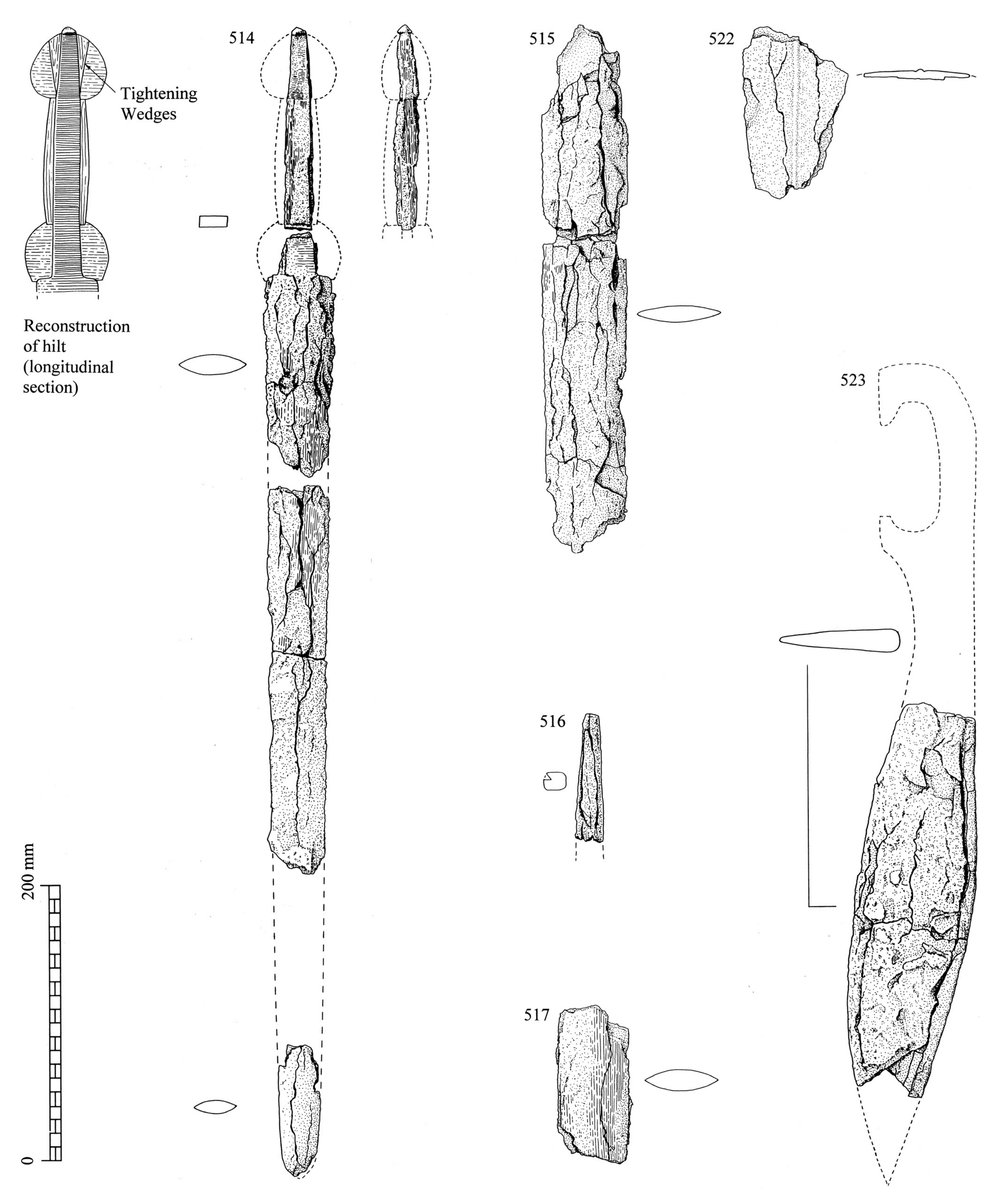


Figure 87 Edged iron weapons, **514** to **517**, **522** and **523**.

certainly comes from the same sword.

Obviously, the original length of the weapon is unknown, but the estimated length shown in the drawing (830 mm overall and 650 mm of blade) is unlikely to be far out. Like **512** and **513**, the blade flares slightly towards the shoulders, and curves gently to a tip of near-parabolic outline. Overall, the blade is rather more slender in outline than **512** or **513**. Its apparent thickness is probably greatly exaggerated as a result of deep corrosion.

Grain from the all-wood hilt assembly is preserved in the surface corrosion. The sword guard was 40 mm deep. The grain runs horizontally across the flat face of the rectangular-sectioned tang. The grip itself will have been effectively a tube of wood, with the grain running along the tang. The pommel was approximately 48 mm deep. Again transverse grain adheres to the front and back of the tang. The mortise through the pommel would have been cut through the plane of the grain for maximum resistance to splitting. Grain of a different orientation runs down the sides of the last few centimetres of tang. As with the grip itself, this runs along the tang, but does not meet the grain of the grip; the grain of the pommel interrupts it. The explanation for this is that the swordsmith used tightening wedges between the tang and pommel to secure the hilt assembly. The last few centimetres of the tang are tapered, so that once the three elements of the hilt had been

dropped on, wedges could be slipped into the top of the pommel mortise, on either side of the tang, and tapped down until the whole hilt was firmly fixed. The tops of the wedges would then have been cut off and sanded flush with the surface of the pommel. It can be seen that the projecting length of the tang was hammered over to fix the whole assembly permanently.

As with sword **513**, the appearance of the hilt assembly is uncertain but the grip would have been roughly tubular, with the pommel and guard well rounded but somewhat flattened by this date, as the metal guard plates show (**524–527**). The grip was probably embellished with some simple pattern, such as facets or a 'candy-twist'.

It was sheathed when buried. Traces of the grain of the longitudinal wooden slats of the scabbard are fused into the corrosion products. No scabbard fittings are associated, but the hilt has evidence of an all-wood hilt assembly clear enough to allow a detailed reconstruction.

515

Fragment of sword blade
Provenance: 'House N[orth] of T[ower of the] Arch[ers]'*
Yale no. 1938.5999.1025
Dura no. unknown
Length 383 mm+, width 58–61 mm, thickness 11 mm
* This provenance, on a label attached to the blade, is obscure.

A fragment of a broad-bladed sword of lenticular section. Both ends are lost. Corrosion and fissuring are extensive. The weapon is almost certainly a *spatha*. Traces of wood grain on its surface show that it was sheathed at burial.

516

Sword tang
Provenance unknown
Yale no. 1938.5999.1026
Dura no. unknown
Length 92 mm+, width 20 mm tapering to 10 mm

A heavily corroded and fissured tang, of roughly rectangular section, probably from a *spatha*.

517

Fragment of sword blade
Provenance: 'B2-NStr1'
Yale no. 1933.694 (part of)
Dura no. F1353
Length 113 mm+, width 50 mm, thickness 15mm

A heavily-corroded length of sword blade of lenticular section. Both ends are lost. Extensive traces of wood grain on its surface show that it was sheathed at deposition. Probably from a *spatha*.

518

Fragment of sword blade (Fig. 59)
Provenance: probably Tower 19 countermine
Yale no. 1938.5999.1120*
Dura no. unknown
Length 145 mm+, width 40 mm, thickness 12 mm
* See discussion under 383 etc.

A fragment of sword blade of lenticular section, attached to mail fragment **383**.

519

Fragment of sword blade (not illustrated)
Provenance: B2-D12
Yale no. 1933.694d*
Dura no. F1321
Length 156 mm
* One of a number of sword fragments labelled 1933.694, this one here called 'd' for identification.

This might be part of sword **514** but does not obviously belong to it and there is clearly an error of numbering in the registers, so certainty is not possible. No complete cross-section is preserved.

520

Fragment of sword blade (not illustrated)
Provenance: B2-D12
Yale no. 1933.694 (part of)
Dura no. F1355b
Length 112 mm

Like **519** also possibly part of sword **514**, but no joins were found. No complete section preserved.

521

Fragment of a sword blade (not illustrated)
Provenance unknown
Yale no. 1938.5999.1027
Dura no. unknown
Length 106 mm+

Revealed as a fragment of a sword blade by the camber of its surface. As it preserves no complete section, its original width and thickness are not known.

522

Fragment of a dagger
Provenance unknown
Yale no. 1938.5999.1028
Dura no. unknown
Length 125 mm+

A fragment of a broad flat blade. Neither edge is preserved, and only one surface. However, its flatness and characteristic midrib leave little doubt that this is part of a *pugio*, a Roman military dagger.

Third-century *pugiones* are less common than first-century ones (for a gazetteer of the latter, see Scott 1985), but a large hoard found at Künzing (Hermann 1969, fig. 3; Schönberger and Herrmann 1968; Reuter 1999) shows that they were still available. However, there is no evidence to suggest that they continued in use into the fourth century. A *pugio* was found at Zeugma, which in form might be a third-century type like the Kunzing examples (Kennedy with Bishop 1998, 135–7, fig. 5.9).

523

Fragment of sword
Provenance unknown
Yale no. 1930.596a-d*
Dura no. unknown
Length 285 mm+, width 85 mm, thickness 16 mm
*This object may be that described as a large spearhead in *Rep.* III, 79, although this refers to 1930.591a–d. The dimensions are very similar, the time of discovery the same and the numbers differ by a single digit. I believe they are probably one and the same, and that there are some small errors in the published report.

Four joining fragments of a single-edged, asymmetric blade. Heavily corroded and fissured. The very characteristic profile and single edge of this weapon identify it as an example of a common sword type in use right across the Mediterranean and the Hellenistic world in the last centuries BC. In the Eastern Mediterranean it was known as the *kopis* or *machaira*, in Spain the local variant was called the *falcata* (Sanz 1992). There is no evidence that such weapons were still current in the third century AD; this piece was probably deposited in a Hellenistic or Parthian context.

Hilt fittings

524

Copper alloy hilt-guard plate
Provenance unknown
Yale no. 1938.2242
Dura no. unknown
Length 69 mm, width 29 mm+

About three-quarters of the object survives, in a lightly corroded condition. It is the metal plate protecting the underside of the hilt guard of a Roman sword. Such guards were often of wood (see blades **513** and **514**; Fellmann 1966; Vindonissa: Unz and Deschler-Erb 1997, nos 19–21), roughly hemispherical but later were usually somewhat flattened to an oval section, as here. From an early date the undersides of wooden guards were often reinforced with a copper alloy plate, presumably to improve resistance when parrying blows (e.g. Colchester: Hawkes and Hull 1947, 340, nos 4–6, pl. CIV; Crummy 1983, 138, no. 4244, fig. 159; see also Neeb 1918, 175, fig. 6). By the end of the second century AD these plates had acquired a rim, so that they enclosed the lower part of the guard (e.g. the plate *in situ* on the Lyons *spatha*: Wuilleumier 1950, fig. 1). **524** has remains of pierced ornament on its broken side, a feature better preserved on **525–527**. The lower, exposed face of the guard plate has grooves running off the tang aperture to allow a snug fit to the shoulders of the blade. Very similar examples, with pierced decoration on one side only, are known from Germany, from the Saalburg (Jacobi 1897, 485, pl. 56:1) and Zugmantel (*SJb*. III, 1912, 48, pl. 13:3), and now from Thamusida, Volubilis and Banasa in Mauretania (Boube-Piccot 1994, nos 237–8, 239–41, and 242 respectively).

525

Copper alloy hilt-guard plate
Provenance: L7-W
Yale no. 1938.2316
Dura no. F446
Length 72 mm, width 29 mm

A largely intact plate like **524**. The decoration, which again is on one side only, is interrupted by a rivet hole for attachment to the wooden part of the guard.

526

Copper alloy hilt-guard plate
Provenance: K1-W
National Museum, Damascus
Dura no. H527
Length 65 mm, width 30 mm

Apparently sent to Damascus, although photographs, drawings and a description are preserved on a record card at Yale. It is a virtually complete example of the type represented by **524** and **525**.

527

Copper alloy hilt-guard plate
Provenance: G1-2 (?)
National Museum, Damascus
Dura no. E433
Length 76 mm, width 33 mm

Details from Yale records. Similar to **524–526**.

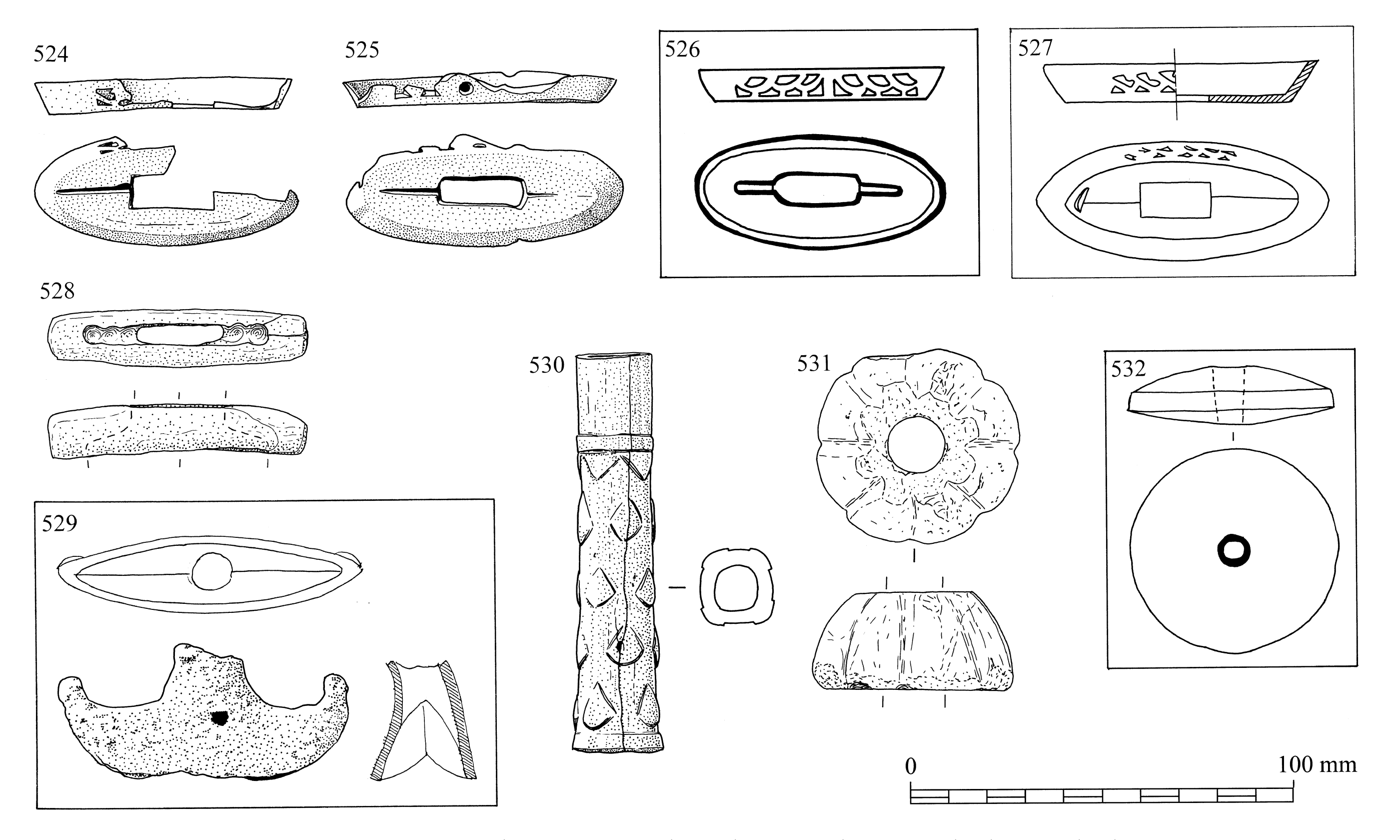


Figure 88 Hilt fittings from edged weapons: copper alloy (**524** to **527** and **529**), bone (**528** and **530**) rock crystal (**531**) and jade (**532**).

528
Bone hilt guard
Provenance unknown
Yale no. 1938.707
Dura no. unknown
Length 68 mm, thickness 15 mm
Russell 1976, 56, no.5

A complete hilt guard of roughly circular cross-section, slightly curved along its length. The seating for the shoulders of the blade cut into the underside was for a two edged blade *c.*48 mm wide but only 5 mm thick. This is much thinner than any sword found at Dura but would accord well with a broad dagger, perhaps a form related to or derived from the *pugio* (see blade **522**).

A very similar guard made of bone has been found at Kastell Oberstimm (Schönberger 1975, 286, pl. 112:F8), and another from the Hague (late second to early third century: Waasdorp 1989, 163, fig. 4:b).

529
Copper alloy hilt guard
Provenance: G6-A7
National Museum, Damascus
Dura no. E1352
Length 80 mm

A description, photograph and scale sketches of this object are preserved on record cards at Yale.

It is apparently a hilt guard from a bladed weapon but is quite unlike any known Roman form. Its curved lower edge runs outwards and backwards, flowing into swept quillons which end in spherical knobs. The centre sweeps smoothly up into the grip, which is apparently bent, and certainly snapped off. The card records that the 'width of aperture for blade' is 60 mm, but the drawing suggests 70 mm. The impression given by this object is that it belongs to a weapon akin to the later scimitar. Beyond noting its apparently 'oriental' appearance little may be said regarding its affinities. No representations of such hilts are known to me, and no archaeological parallels are forthcoming.

530
Bone sword grip
Provenance: uncertain*
Yale no. 1934.524a
Dura no. unknown
Length 105 mm, thickness 24 mm
* Confusion surrounds the identity of this object. It is marked 1933.404a but the file card also bears a second Yale number, 1934.524a and two provenances, 'C3' and 'L7-W'. The latter could mean that the object came from the Tower 19 countermine.

It is clearly a grip for a sword blade. Hollowed to accommodate a substantial tang, it is of the size one expects for *spatha* grips, which were often of bone. The surface is embellished with a pattern of diamond- or teardrop-shaped protuberances. This recalls the stylized representations of the club of Hercules seen on glassware and jewellery (M. Hassall, pers. comm.), which would be highly appropriate for a sword. This zone of decoration is defined at each end by a plain raised band. The last 20 mm of the narrower end is left plain.

Early grips from *gladii* and *spathae* had a characteristic pattern of finger-grips, and were polygonal in section (Pompeii: Ulbert 1969b, pls 31:2, 32:1–4; Vindonissa: Unz and Deschler-Erb 1997, nos. 25–44), unlike this specimen which is subsquare in section. Those from the Upper German *limes* forts, which are generally thought to date from the mid-second to mid-third centuries AD, show a much wider variety of pattern than the earlier ones. Most are fairly smooth cylinders, perhaps with bands or a 'candy-twist' pattern around them (Oldenstein 1976, pls 10–11). The Dura example is quite at home in this group, and there is a fairly good parallel to it from Köln-Bickersdorff, found in a well. It has a similar diamond-like decoration on its surface (Schoppa 1951, 78, fig. 4:7). For an extremely elaborate ivory version of unknown provenance now in Mainz, see Mikler 1997, no. 1/1.

531
Rock crystal sword pommel
Provenance: Tower 19 countermine
Yale no. 1938.5999.1121
Dura no. unknown
Height 26 mm, diameter 53 mm

In the Yale records this is associated with blade **513**, but this is not possible (see **513** catalogue entry for discussion). It certainly came from the countermine, where it was found with (but apparently not on) a large sword (*Rep.*VI, 195, 204).

The pommel is circular in plan, and overall is roughly onion-shaped with flat upper and lower surfaces. The tang aperture is cylindrical, 15 mm in diameter. (This is no guide to the shape of the sword tang, since it would be very hard to cut a square aperture without cracking the crystal.) The sides have eight equidistantly spaced shallow vertical grooves and are highly polished. The flat-ground facets at top and bottom are only roughly finished, suggesting that the crystal was only part of the pommel assembly and had some form of cap at each end. Such metal caps have been found, some with radial lines (e.g. Pfünz, *ORL* B73, 38, no. 50, pl. 13:14, 39). Its bulbous form certainly suggests that it comes from a Roman sword, but no

parallels for stone pommels from Roman sites are known to me. This may well be from a sword of Roman type made to reflect oriental taste. Stone pommels on oriental swords are well attested (see **532**).

532
Jade sword pommel
Provenance: Tower 19 countermine
National Museum, Damascus
Dura no. unknown
Height 17 mm, diameter 54 mm

Details of this object, together with a photograph and drawings are in the Yale archives. It was found in the mine close to the 'Persian' helmet with 'a large sword which at the time of discovery was represented only by a few fragments of badly oxidized iron . . . the stone appears to come from Chinese Turkestan.' (*Rep.*VI, 194).

Of highly polished stone, it is discoid with convex faces. It has a tapering axial aperture for the sword tang, from 6 mm to 9 mm across. The stone is described as 'hard, polished, pale yellowish-grey . . . (jade acc.[ording to] Rostovtzeff)' on the site record card.

Flat disc pommels like this are quite alien to Roman sword types. If the identification as jade is correct, then clearly the stone, and probably the sword, is of oriental origin. It was found in association with the 'Persian' helmet and the supposedly Sasanian soldier killed in the mine. This suggests that it may have been a Sasanian weapon. Discoid pommels are known from finds and representations from Povrosk, South Russia to China (Trousdale 1975, 243, no. V1, figs 91–2 and fig. 38 respectively).

Scabbards

Scabbard slides

533
Copper alloy slide
Provenance unknown
Yale no. 1934. 702a
Dura no. unknown
Length 105 mm+

Cast in a single piece in a yellow alloy which is a tin bronze with some zinc (Lillios 1983, sample 3061). The upper end is shaped into a characteristic half-round moulding with a flat rear face originally in contact with the scabbard. The bridge is flat in section and is not embellished beyond the bevelling of its edges. It tapers towards the bottom. The elongated lower end terminates in an ivy-leaf-shaped plate, now slightly damaged, whose original form may have resembled **543**. It is simply embellished with two knife-cuts.

The rear face has two drilled holes, one at each end just clear of the bridge. These contain traces of iron, and originally held iron pins for fastening the slide to the scabbard.

A number of very similar slides have been found in Europe, from Britain to Romania, e.g. Stockstadt (*ORL* B33, 51, no. 34, pl. 8:3 which is broken in the same place); Colchester (Webster 1958, no. 74); Southwark (Dennis 1978, 390, no. 125, fig. 177); South Shields (Allason-Jones and Miket 1984, 3.644 and 3.645); Buciumi (Chirila *et al.* 1972, 92, pl. XCIX:1) and several other Romanian sites (Petculescu 1983, 457–8, fig. 1:3-6). The closest parallels are a group of three examples from Caerleon (Nash-Williams 1932, fig. 36:4, 5, 7) and another found with a *spatha* blade and chape at Lyons (Wuilleumier 1950, 147, fig. 1). These examples reflect the Dura slide in all details down to the knife-cuts on the lower terminal. See Oldenstein 1976, nos 38–49 (esp. no. 44) for similar slides from the Upper German *limes*. Three examples are known from Mauretania (Boube-Piccot 1994, nos 355–6, from Banasa; no. 357, from Volubilis).

534
Copper alloy slide
Provenance unknown
Yale no. 1938.2270
Dura no. unknown
Length 95 mm+

As **533** except that the lower terminal is lost.

535
Copper alloy slide
Provenance unknown
Yale no. 1938.2273
Dura no. unknown
Length 92 mm+

As **533** except that the lower terminal is lost. The slide is also bent, as if the top had been wrenched away from the scabbard. This might account for the loss of the lower terminal.

The alloy is a tin bronze, with a high proportion of lead perhaps to aid casting (Lillios 1983, 24, sample 3060).

536
Copper alloy slide
Provenance unknown
Yale no. 1938.2272
Dura no. unknown
Length 75 mm+

As **533**, but snapped off at the lower end of the bridge.

537
Copper alloy slide
Provenance unknown
Yale no. 1938.2274
Dura no. unknown
Length 66 mm+

As **533**, but snapped off at the lower end of the bridge.

538
Copper alloy slide
Provenance: 'G3-Room NE'
Yale no. 1938.2269
Dura no. K8
Length 71 mm+

As **533**, but snapped off at the lower end of the bridge. There is a heavily corroded iron locating pin on the rear side.

539
Copper alloy slide
Provenance unknown
Yale no. 1938.2279
Dura no. unknown
Length 47 mm+

Basically the same type as **533**, snapped off halfway along the bridge. However, it differs from **533** in that the locating pins are of copper alloy, apparently cast in one piece with the rest of the slide. This is unique among the slides from Dura, but is more common than inserted iron pins in Europe. Around the junction of the moulded upper terminal and the bridge is a deposit of iron oxide, suggesting that iron wire was bound around the slide at that point, presumably as a reinforcement for the locating pins holding it to the scabbard.

540
Copper alloy slide
Provenance unknown
Yale no. 1938.2271
Dura no. unknown
Length 64 mm+

As **533**, but snapped off near the bottom of the bridge; the tip of the upper terminal is lost.

541
Copper alloy slide
Provenance unknown
Yale no. 1938.2444
Dura no. unknown
Length 46 mm+

Probably as **533**, but snapped off about halfway down the bridge. Most of the upper terminal is also lost.

542
Copper alloy slide
Provenance unknown
Yale no. 1938.5999.1029
Dura no. unknown
Length 68 mm+

Probably as **533** except that the bridge is curved rather than flat in cross-section. It is snapped off at the lower end of the bridge and the tip of the upper terminal is lost. It is impossible to tell whether it ever had fastening pins inserted in its rear face, since the piece is too corroded.

543
Copper alloy slide
Provenance: 'G2-Main St.'
National Museum, Damascus
Dura no. K245
Length 95 mm+
Known only from a record card and photograph in the Yale archive. The picture bears a Damascus negative number (negative 142).

This is clearly of the same type as **533–542**, and is almost complete. It is hard to tell from the photograph, but it probably had the same moulded upper terminal as **542**. The lower end has an ivy-leaf terminal with a pair of 'wings', which may once have been present on the terminal of **533** as well.

The terminal is paralleled on a piece from Pfünz (*ORL* B73, 23, no. 18, pls 15, 28) and rather less closely on a number of other examples (e.g. Saalburg: Jacobi 1897, 487, fig. 78:2). The closest is a slide from Jagsthausen (*ORL* B41, 38, no. 5, pl. 3:10), but this slide is of a different type. The drawings make it clear that **543** had iron fastening pins like **533** etc., and the lower of these was apparently set in a hole drilled right through the copper alloy, something otherwise known only on two slides from Niederbieber (Oldenstein 1976, nos 45 and 55).

544
Copper alloy slide
Provenance unknown
Yale no. 1938.3160
Dura no. unknown
Length 47 mm+

Lower terminal of a cast copper alloy slide of basically the same form as **533–543**, but of a more ornate design. Broken off some way below the bridge, the shaft is of ovoid section, much thicker than the flat plates **533–535** and **543**. It has cast mouldings on its outer surface. The terminal is an

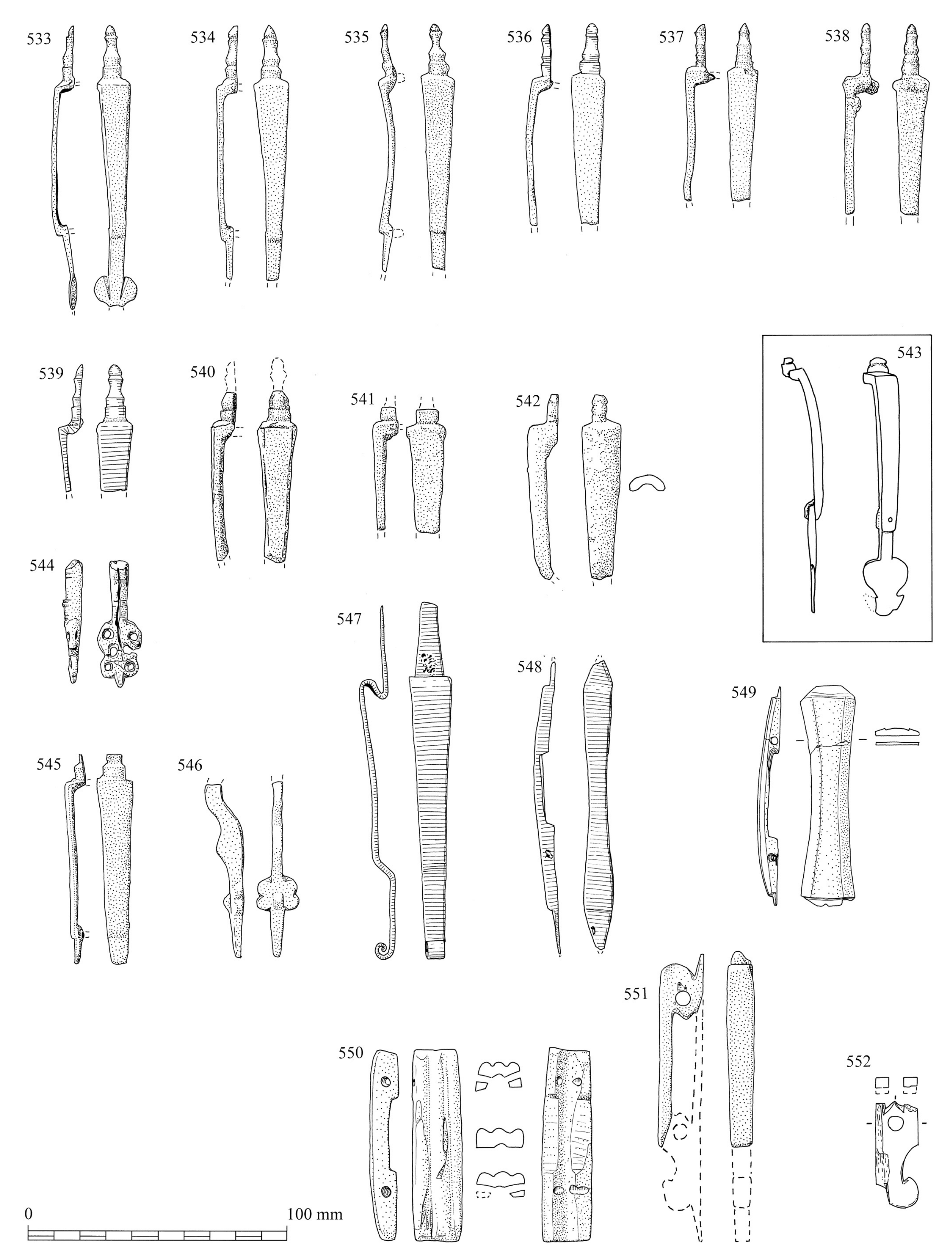


Figure 89 Scabbard slides from swords: copper alloy (**533** to **548**) and bone (**549** to **552**).

elaborated heart shape, with a pair of lower lobes, and is pierced by three pairs of holes. The basic casting has been cleaned up with a file. A slide from Zugmantel (Jacobi 1924, 58, pl. 7:4) closely parallels the mouldings on the shaft, the shape of the shaft and the six apertures. The slide is also close to one from Niederbieber (Oldenstein 1976, no. 50) which is more or less complete. The rest of this German example resembles **533–543**, suggesting that the same was true of **544**.

545

Copper alloy slide
Provenance: 'G3-a2'
Yale no. 1932.1583
Dura no. E688
Length 78 mm

An apparently complete cast slide, with a bridge of the same form as **533**, and added iron fastening pins. However it lacks the extended lower end and also the upper moulded terminal. Instead it ends in thin flat copper alloy tongues. It is suggested that this slide was originally of the same type as **533**, but that its terminals have been filed down into tabs to make it functionally similar to **548**. No close parallels are known.

546

Copper alloy slide
Provenance unknown
Yale no. 1938.3168
Dura no. unknown
Length 65 mm+

The lower end of a slide made to resemble a serpentine creature. Parallels suggest a stylized dolphin (Dixon 1990). The closest is from Jagsthausen (*ORL* B41, 38, no. 5, pl. 3:10). There are others from Zugmantel (*ORL* B8, 64, no. 17, pls 11, 22) and Caerleon (Collingwood and Richmond 1969, fig. 108b). There are also examples from South Shields (Allason-Jones and Miket 1984, 3.648), Carlisle (Padley 1993) and two from Romania (Petculescu 1983, 458, fig. 2:8-9).

547

Copper alloy slide
Provenance unknown
Yale no. 1938.2275
Dura no. unknown
Length 133 mm

A complete slide made by bending a strip of metal rather than by casting. Like **533** etc., the top of the bridge is wider than the bottom, in order to spread the load of the baldric which exerts most stress at this point. The direction of the thrust of the strap, i.e.up the slide, is perhaps represented by the distortion of the bridge in that direction. There were no securing pins on the inner face. Instead the slide must have been held on at the top by the extended copper alloy tongue which was either thrust into the structure of the scabbard (i.e. under a leather covering) or was attached by binding around it. It must be assumed that the lower end was also held by such binding, between the end of the bridge and the coiled tip which acted as a secure anchor.

The alloy is somewhat heterogeneous in structure, varying from copper to high zinc brass (Lillios 1983, sample 3059).

There seem to be no close parallels for this simple copper alloy form, although it is close to an iron example from the Saalburg (Hundt 1960 fig. 1:7). The coiled end is also best paralleled on an iron example from the same site (Hundt 1960, fig. 2:1). Such coiled or cylindrical terminals are commonplace on iron slides (e.g. an example from the Saalburg, Oldenstein 1976, no. 77).

548

Copper alloy slide
Provenance unknown
Yale no. 1938.2276
Dura no. unknown
Length 106 mm+

A nearly complete cast copper alloy slide, distinctly waisted across the middle of the bridge. Unlike the above examples it is longitudinally symmetrical and so has no obvious upper end. Each end terminates in a thin triangular copper alloy tongue, which in the absence of fastening pins were the only means of attachment to the scabbard.

This slide is so far unparalleled in copper alloy, though a number of bone versions are known. See **549** for references.

549

Polished bone slide
Provenance unknown
Yale no. 1938.701
Dura no. unknown
Length 81 mm
Russell 1976, 55, no. 2

Complete, but broken in two when found. Like **548**, it is waisted centrally, over the bridge. Embellishment is limited to the chamfered edges and the moulded central ridge. Each end has a short thin tongue as part of the method of attachment. Locating pins are lacking, but transverse holes are bored above and below the bridge cut-out. These apertures presumably took cords or wires to reinforce the attachment provided by the tongues. The inside of the bridge shows knife marks from manufacturing, and also evidence of polishing from wear caused by the chafing of the baldric where it passed through the slide. This wear shows which end was the top, and it is noteworthy that the slide broke at the point of maximum stress.

It is a type well represented in the West: at South Shields (Allason-Jones and Miket 1984, no. 2.34), Great Chesters (Allason-Jones 1996, no. 7), Niederbieber (Oldenstein 1976, no. 64), Mainz (Mikler 1997, nos 3/7–3/10), Heddernheim (Oldenstein 1976, 101, n. 259), Augst (Deschler-Erb 1998, no. 4014), Micia, Romania (Petculescu 1983, 459, fig. 2:18), Vimose in Denmark (Trousdale 1975, 222, no. E5, pl. 15a) and Banasa, Mauretania (Boube-Piccot 1994, no. 353). A further example, almost indistinguishable from **549**, was found during excavations in the City of London (F. Grew, pers. comm.).

550

Polished bone slide
Provenance: 'F3-16'
Yale no. 1933.430
Dura no. F1229
Length 71 mm
Russell 1976, 55, no. 1

A thicker and more crudely made slide than **549**, slightly damaged at the back. Basically rectangular in plan, it lacks the waisting of **549** and also the characteristic terminal tongues of the type. However, it does have the same transverse holes for binding cords. It also has a longitudinal groove running up the back which presumably accommodated a spine along the centre-line of the scabbard. Embellishment is confined to two shallow grooves down its outer face.

No close parallels are known, but it is clearly related to the type represented by **549**.

551

Polished bone slide
Provenance unknown
Yale no. 1938.702
Dura no. unknown
Length 72 mm+
Russell 1976, 55, no. 3

The upper terminal and bridge of a well-known slide type, which resembles the **549** type in having tongues at each end and a cord hole each side of the strap aperture. However, this type differs in being much deeper and in having a fully enclosed aperture to accommodate the baldric rather then the simple cut-out in the back seen on **533–550**.

More complete examples of this type found elsewhere have an elongated lower end which has a cylindrical knob, probably meant to be a volute, just above the terminal tab (see **552**). For examples from London and South Shields see Chapman 1977, and Allason-Jones and Miket 1984, no. 6.1. A group are preserved in Mainz (Mikler 1997, nos 3/1–3/6). Others have been found at Augst (Deschler-Erb 1998, no. 4013), Vimose in Denmark (Trousdale 1975, 221, no. E2, pl. 14C), Novae in Bulgaria (Trousdale 1975, 229, no. E35, pl. 17B), Romania (Petculescu 1983, 459–60, fig. 2:20) and two from Syria itself, from the cemetery at Khisfine (Trousdale 1975, nos S1 and S2, pls 18:c–d, 19:a–b; Gogräfe and Chehadé 1999). A fragmentary object from Banasa, Mauretania, probably represents a similar piece (Boube-Piccot 1994, no. 354).

552

Fragment of bone scabbard slide
Provenance: F3-1
Yale no. 1938.730
Dura no. F1090
Length 39 mm+

A fragment of a slide identical to **551**.

Scabbard chapes

553

Copper alloy chape
Provenance: 'redoubt'
Yale no. 1938.2243
Dura no. G2004
Length 53 mm, width 52 mm

A complete cast copper alloy chape, of rounded outline, with approximately semicircular projections from the middle of the edges of the mouth. The front face is elevated above the surrounding edges by a step in the metal. Both front and rear faces contain two perforations of lunate outline. A raised spine runs down the front face only. The upper edge of the front projection is crudely embellished with knife-cuts. In overall appearance this type resembles a *pelta* with developed

terminals, and thus belongs to the type here labelled 'peltate'.

This is the only completely intact example of the commonest form of chape found at Dura – a type readily paralleled on Roman military sites throughout Europe, e.g. Vindonissa (Unz and Deschler-Erb 1997, no. 176), Osterburken (*ORL* B40, 35, no. 12, pl. 7:45), Zugmantel (Jacobi, 1924, 58, pl. 7:2), from Britain (one now in the Fremington Hagg hoard, possibly added in Victorian times: Webster 1971, no. 6) and Romania (Buciumi: Chirila *et al.* 1972, pl. CXV:22). The unusual knife-cut decoration on **553** links it particularly with another from Osterburken which has analogous, albeit cast decoration (*ORL* B40, 35, no. 12, pl. 7:52). For general parallels from Upper Germany, see Oldenstein 1976, especially nos 122–7 and the related nos 101 and 112–20.

554
Copper alloy chape
Provenance unknown
Yale no. 1932.1523
Dura no. unknown
Length 55 mm, width 60 mm

Largely intact copper alloy casting. The upper central part of the rear face is missing. Its overall form resembles **553**, but it is rather wider and flatter, and the peltate cut-outs are rather more crisply defined. The semicircular upper edge projection is plain.

555
Copper alloy chape
Provenance unknown
Yale no. 1938.3509
Dura no. unknown
Length 52 mm+, width 59 mm

Largely complete, but extensively corroded and crushed. Its form clearly resembles **553** and **554**, and almost certainly had the same semicircular upper edge projections.

556
Copper alloy chape
Provenance unknown
Yale no. 1932.707
Dura no. unknown
Length 44 mm+, width 51 mm

Largely complete, except that the upper central portions of the front and back plates have broken across the peltate cut-outs.

557
Copper alloy chape
Provenance unknown
Yale no. 1938.2241
Dura no. unknown
Length 53 mm+, width 58 mm

Most of the top and upper right side is lost, and the remainder has been split and distorted by heat.

558
Copper alloy chape
Provenance unknown
Yale no. 1938.3401
Dura no. unknown
Length 49 mm+, width 51 mm+

About half of this piece survives, below a diagonal line running from top right to bottom left. It has a raised face, midrib and peltate apertures.

559
Copper alloy (?) chape
Provenance: Tower of the Archers
Location unknown
Length 45 mm, thickness 6 mm
A brief description and rough drawing were published in Cumont 1926, 261, pl. XCVII:4.

This ovoid chape, apparently of copper alloy, had the raised face, midrib and (originally) peltate apertures seen on **553**, and is clearly of the same type. The upper central part of the front face is broken away as in **556**. This piece is peculiar in having a triangle engraved on either side of the midrib, which so far is unparalleled elsewhere.

560
Copper alloy chape
Provenance unknown
Yale no. 1938.3449
Dura no. unknown
Length 46 mm+, width 59 mm

This appears to be of the same general type as **553**. However, the front (?) plate has been entirely torn away, so that although it certainly had peltate cut-outs it is not known whether it had a raised front face or an unelevated one, as seen on the slight variant, **561**.

561
Copper alloy chape
Provenance: Palmyrene Gate
Yale no. 1938.2240
Dura no. K129
Length 63 mm, width 63 mm

A rather crushed chape, from which the upper part of the back plate has been torn across the peltate cut-outs. When found, the upper part of the front plate was still attached and appears on a site photograph (number unknown) and a scale drawing. Now lost, this part is shown in outline on the drawing. Clearly very closely related to the type exemplified by **553**, it differs only in lacking the raised front face defined by a characteristic step.

It is well paralleled at Niederbieber (Oldenstein 1976, no. 117) and Zugmantel (Jacobi 1924, 58, pl. 21:1).

562
Copper alloy chape
Provenance: 'L7-W'*
Location unknown
Dura no. unknown
Length 66 mm, width 61 mm
* This provenance means that this object may be from the Tower 19 countermine.

A chape known only from a site record card preserved at Yale. The object itself was not located in the collection. However, the sketch is detailed enough to show that it was the same type as **561**, although the tab on the upper edge is squarer. It also apparently had some kind of stud or plate on the bottom, but the sketch provides insufficient information to determine what function this served.

563
Copper alloy chape
Provenance: G5-29
Location unknown
Dura no. unknown
Length 55 mm, width 60 mm

Known only from a site record card preserved at Yale. The sketch on the card is too crude to reveal more than that this object had the same ovoid outline and peltate cut-outs as **553–562**. Whether it had the central rib, or whether the upper edges were really straight as shown, is uncertain.

564
Bone chape (Figs 84 and 90)
Provenance: B3-2
National Museum, Damascus
Dura no. F877 (part of)
Length 61 mm+, width 70 mm

Still attached to a sword when found. The weapon, **512**, is now in Damascus. It has been published (*Rep.* VI, 82–3, pl. XXVI:2). No detailed photographs are available (although it appears with **512** in Fig. 84), but a scale drawing indicates that this is a bone analogue of the copper alloy **553** and **554**, ovoid with a raised face and perforations towards the top. However, the axial ridge seems to be absent. The upper central portion has apparently broken away. Niederbieber has yielded a similar chape (Oldenstein 1976, no. 178).

565
Bone chape
Provenance unknown
Yale no. 1930.714
Dura no. unknown
Length 46 mm

A small fragment of the front face of a bone chape, with a median ridge and traces of a perforation on each side. By analogy with other Dura chapes, this comes from a bone version of **554** or **561**, depending on whether it possessed or lacked a raised face. Similar chapes have been found at South Shields (Allason-Jones and Miket 1984, 47, 49, no. 2.81) and Augst (Deschler-Erb 1998, no. 4027).

566
Iron chape
Provenance unknown
Yale no. '1932.1718 (probably)'*
Dura no. E1289
Diameter 78–80 mm, thickness 23 mm
* This object is so labelled but the Yale card-catalogue does not include it.

A circular iron chape, a shallow cylinder in form. It is considerably wider than the scabbard, as is shown by the width of the aperture for insertion of the tip of the sheath.

Although apparently largely of iron, there are hints of copper around its edge. It is not clear whether this is from a copper alloy internal structure (like **569**) or whether it comes from decoration of the edge with copper alloy strip as seen on the front face.

It is quite heavily corroded overall. The front face bears extensive remains of inlaid copper alloy decoration. This is now heavily damaged and can only be reconstructed in broad outline. The decorative design seems to have consisted of a six-pointed star or engrailed hexagon, surrounding two concentric rings, all in thin copper alloy sheet or foil. Other traces survive, but these are very fragmentary and some parts seem to have been displaced before being fused into the iron oxide.

The centre of the front face is drawn up into a cone of iron, *c.*5 mm high and 10 mm across. At the apex of this is the head of a copper alloy rivet which presumably anchored the chape to the scabbard by transfixing the bottom of the sheath through the upper aperture.

This is related to a class of disc-shaped iron chapes well known in the West, some of which are plain (e.g., Heddernheim: Hundt 1955, fig. 1:1). Most have faces inlaid with intricate geometric decoration in copper alloy. These have been studied by Hundt (1953) and Kellner (1966), and seem to have a rather

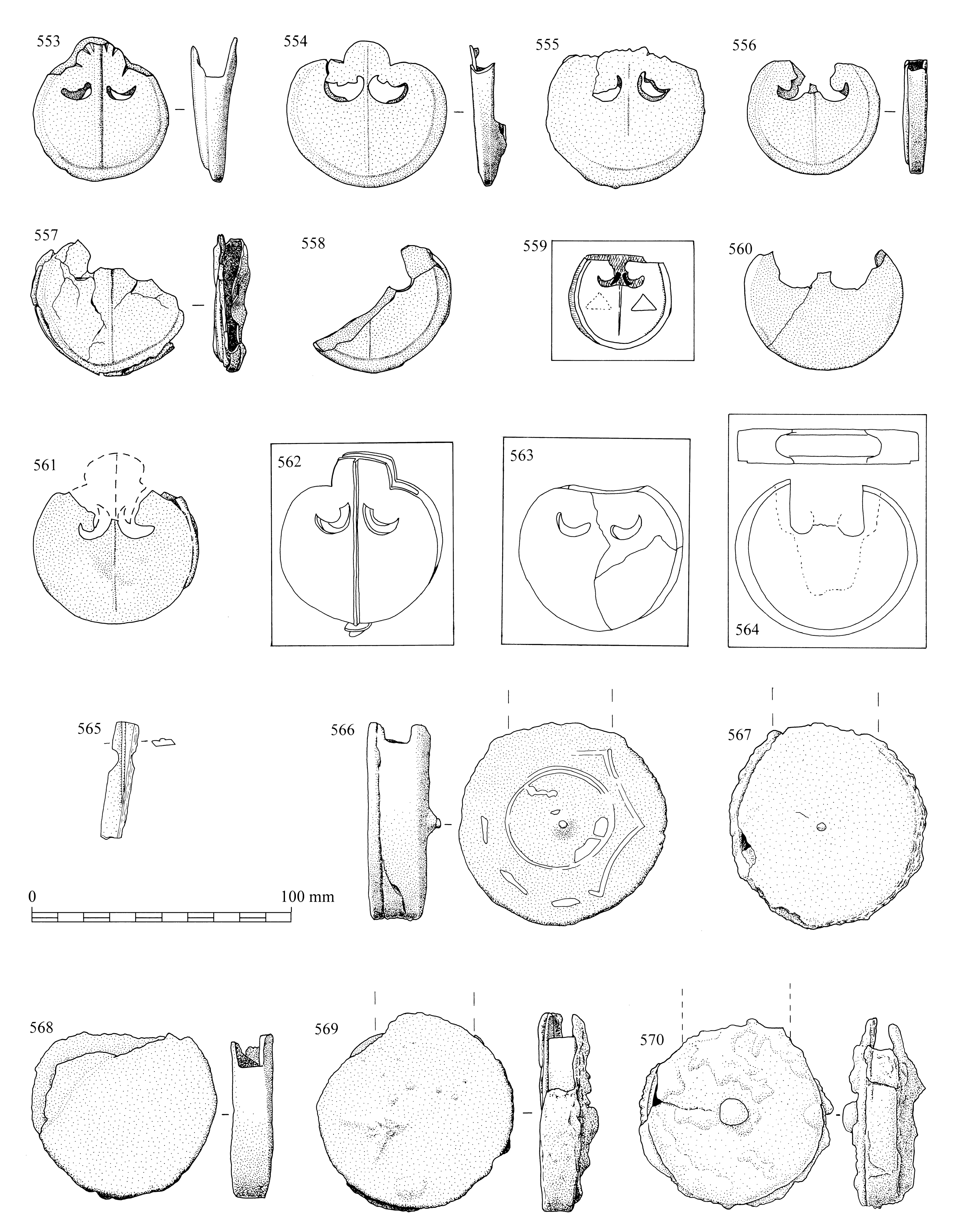


Figure 90 Chapes from sword scabbards, in copper alloy (**553** to **563**), bone (**564** and **565**) and iron (**566** to **570**).

localized distribution (Oldenstein 1976, 116). The apparent sixfold symmetry of **566** differs from known European iron examples which exhibit two-, four- or eightfold symmetry. A copper alloy chape with decoration in sixfold symmetry is known from Nydam (Engelhardt 1865, pl. IX:45).

567

Iron chape
Provenance unknown
Yale no. 1933.700b
Dura no. unknown
Diameter 76–8 mm

A plain iron disc chape, quite heavily corroded and split around the seam between the flat face-plates and sides. A dome-headed copper alloy rivet pierces the centre of the plates in order to hold the end of the scabbard in position. This object also contains traces of leather (?), presumably from the scabbard binding.

568

Iron chape
Provenance unknown
Yale no. 1933.700a
Dura no. unknown
Diameter 72 mm

A plain disc chape, somewhat damaged along its upper edge. Very similar to **567**, but lacking the central rivet.

569

Iron chape
Provenance unknown
Yale no. 1938.5999.1086
Dura no. G187
Diameter 75 mm

A much corroded but apparently plain iron disc chape of unusual construction, in that it seems to have an inner structure of copper alloy covered in iron plate. The reason for this is obscure. It also lacks the central rivet seen in **567**.

570

Iron chape
Provenance unknown, possibly Tower 19 countermine (?)
Yale no. 1938.5999.1122
Dura no. I282*
Diameter 75 mm, thickness (excluding central boss) *c.*22 mm
* This number is also seen on limb defence **446**.

A heavily corroded iron disc-shaped chape, with a large central dome-headed rivet *in situ*. The latter presumably attached the chape to the scabbard, the aperture for which is *c.*40 mm wide.

571

Copper alloy chape
Provenance unknown
Yale no. 1938.2239
Dura no. unknown
Diameter 64 mm

A fine disc chape of copper alloy, in excellent condition. The closest parallels known to me are from Nydam (Engelhardt 1865, pl. IX:45–7). Hundt thought these were German imitations of Roman iron disc chapes (1960, 66), but the simple decoration of inscribed rings, such as appear on copper alloy shield bosses, suggests that they are indeed of Roman manufacture. A similar chape from Banasa in Mauretania would seem to confirm this (Boube-Piccot 1994, no. 335).

572

Bone chape
Provenance: 'L7-W'*
Yale no. 1938.708
Dura no. F1801
Diameter 86 mm
* Possibly from the Tower 19 countermine.

A well-preserved bone disc chape, with a flat rear face but the centre of the front face is domed, with a raised lip around the edge. The marks of the drill and subsequent knife work to make the mouth are still visible. There is a central hole for an anchoring rivet, as on **567**.

A similar chape is known from Niederbieber (Oldenstein 1976, 245, no. 185, pl. 28), and an almost perfect parallel from Mainz (Mikler 1997, no. 4/10). See also examples from Augst (Deschler-Erb 1998, nos 4029–31). A comparable example, of ivory held to an ivory scabbard by a central golden rivet, was found at Khisfine in Syria (Trousdale 1975, no. S1, pls 18d, 19a–b; Gogräfe and Chehadé 1999, 75, fig. 2).

573

Ivory chape
Provenance: N8-W1
Yale no. 1934. 529
Dura no. G679 (?)*
Diameter 58 mm
* Struck out on catalogue card.

About half of a chape of hard white material, which judging from its laminated state is almost certainly ivory. Too much has been lost for certainty, but it was probably a plain disc chape. Found with **574**.

Another ivory example is known from Mainz (Mikler 1997, no. 5/4).

574

Bone chape
Provenance: N8-W1
Location unknown
Dura no. unknown
Diameter 65 mm

A bone disc chape known only from a site card preserved at Yale. About half the object survived at the time of discovery. Found with **573**.

575

Bone chape
Provenance: G2-24
Yale no. 1938.709
Dura no. E918
Height 53 mm, width 62 mm
Russell 1976, 55, no. 4

A sort of small disc chape, but with the upper edge cut straight across. Below the centre of the rear edge is a small rivet hole, which probably corresponded with another on the upper front face (now lost). The doming of the faces gives it a strongly lenticular appearance. The best parallel is an iron example from Niederbieber (Oldenstein 1976, no. 137).

576

Copper alloy chape
Provenance: E7-W12
Location unknown
Dura no. E1235
Height 74 mm, width 52 mm
Published in *Rep*. V, pl. XXIII:2.

The original drawing survives at Yale and provided the above dimensions. The lower edge is a parabolic curve, while the centre part of the front upper edge sweeps up into the form of a fleur-de-lis. A narrow median ridge up the front face formed the only surface embellishment. Both upper central portions of the face-plates had been broken away, but the front one was found with the object and thus was restored to its correct position in the drawing.

This is a type common throughout Roman Europe. There are good examples at Zugmantel (*ORL* B8, 63, no. 13, pl. 11:5; Jacobi 1924, 58, pl. 21:2), Lyons (Wuilleumier 1950, fig. 1), Vindolanda (Birley 1977, pl. 25), Caerleon (Nash-Williams 1932, fig. 36:16-22) and South Shields (Allason-Jones and Miket 1984, nos 3.397 and 3.398). However, these Western examples do not have such well defined fleurs-de-lis.

577

Copper alloy chape
Provenance: E7-W
Yale no. 1932.1522
Dura no. E1226
Height 56 mm+, width 55 mm

Identical to **576**, except that the fleur-de-lis is lost.

578

Copper alloy chape
Provenance: G2-40
Yale no. 1932.1524
Dura no. E1127
Height 55 mm, width 48 mm+

Of the same type as **576**, but most of the front face and the uppermost part of the back plate have been torn away. The back plate preserves a rivet hole just below the upper edge projection.

579

Copper alloy chape
Provenance: B2-B5
Yale no. 1938.2287
Dura no. F1997
Height 68 mm, width 57 mm

Largely intact chape, from which corrosion products have been removed. The bottom left side is holed in two places and the top of the left aperture is missing. The cleaning process has made it difficult to tell if the upper rear edge is intact or damaged.

This relatively ornate piece seems to be a hybrid, displaying the peltate apertures and upper edge projection of **553**–**562**, but being closer to **576** and **577** in its outline. It lacks the median ridge seen on both these types. The elegant curves and facets of the upper edge projection suggest a pair of diving dolphins 'kissing' at the base. It is possible that fine inscribed surface detail may have been lost to corrosion and over-enthusiastic modern cleaning. Alternatively, the piece may be unfinished, or a degenerate copy of a more detailed piece.

There is a reasonably close parallel, with similar peltate apertures and a tall axial projection of rather different form, from Nitra, Slovakia (Tejral 1994, fig. 2:3).

580

Copper alloy chape
Provenance: B2-B14
Yale no. 1938.2321
Dura no. F1294
Height 46 mm, width *c.*48 mm

A fairly simple copper alloy chape with two peltate apertures and a rivet hole slightly above the centre of the outer face. The only surface

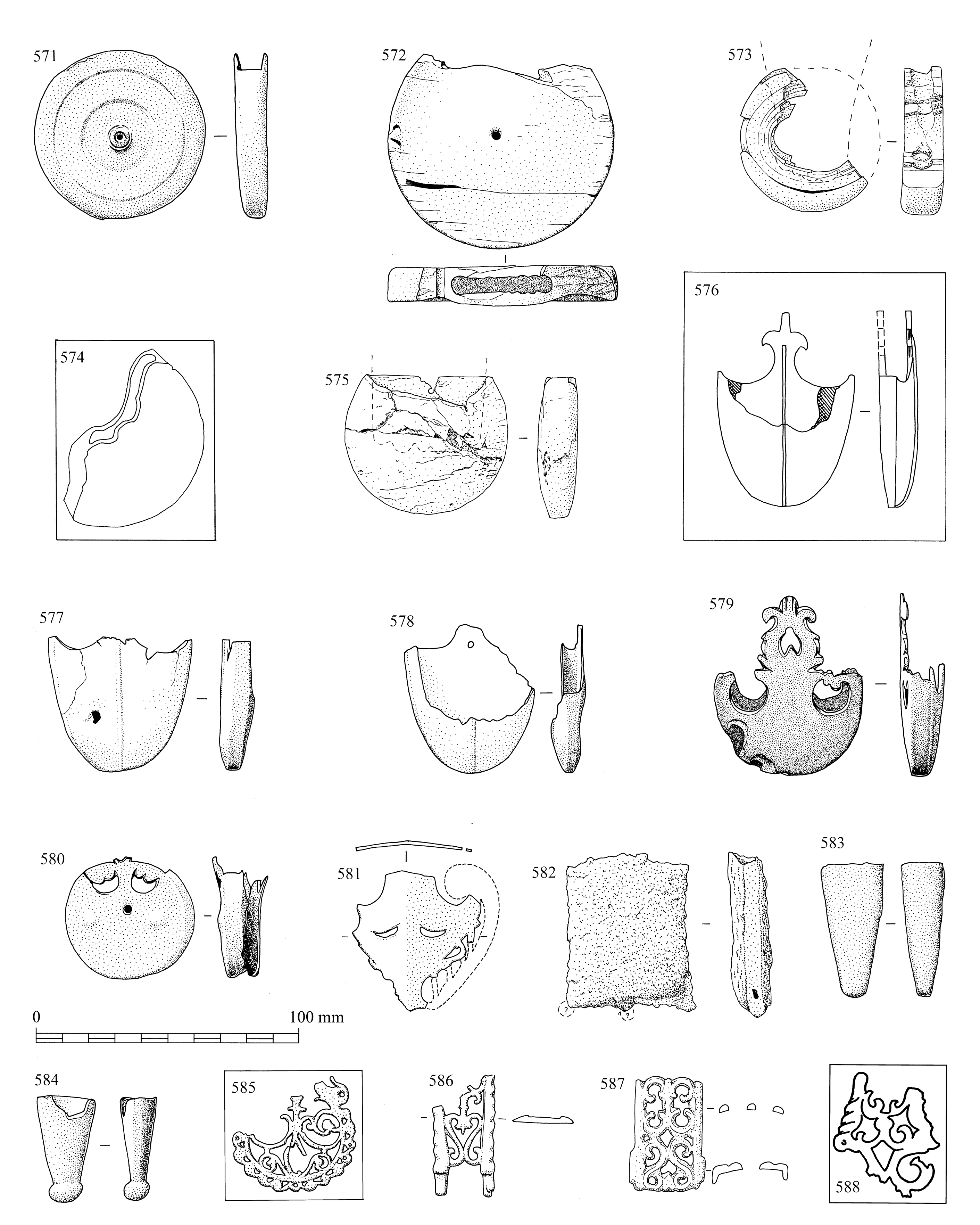


Figure 91 Chapes from sword scabbards in copper alloy (**571**, **576** to **581**), ivory (**573**) bone (**572**, **574**, **575**) and iron with copper alloy (**582**). Also, copper alloy dagger chapes (**583**, **584**) and scabbard plates (**585** to **588**).

embellishment consists of the two rounded and very shallow protuberances on
the front of the piece. These are also found on a very similar piece from Zugmantel (Oldenstein 1976, no. 119) and another rather more ornate chape from Stockstadt (Oldenstein 1976, no. 115).

581

Copper alloy chape
Provenance unknown
Yale no. 1938.2118
Dura no. unknown
Width 47 mm+, height 53 mm+
Known from a site sketch preserved in the card-catalogue at Yale, and published in Frisch and Toll 1949, pierced bronze no. 89

Probably cast, it has an axial carination, perhaps to stiffen it. The pierced running-S edge-pattern relates it closely to **31**, hilt fittings **524** to **527** and other items such as **361** and **363**. It is probably related in form and function to pieces from Saalburg and Zugmantel (Oldenstein 1976, nos 255–6).

In the drawing published in Frisch and Toll 1949, a large piece of the right side had clearly been lost since the site sketch was made. The latter is not particularly well executed, but reveals some interesting details.

Its outline was almost parabolic, perhaps tending towards a point at the bottom, relating it to chapes **576–578**. However, the upper edge sweeps into volutes, with a central projection rising between them. The form of the latter is uncertain; it appears to have been broken off. Up the central axis ran either one broad ridge or more probably a pair of narrow ridges, a feature paralleled on a piece from Niederbieber (Oldenstein 1976, no. 155). On either side of this were two narrow lunate apertures. It is very close in form and detail to a type known from a substantial number of finds from Volubilis and Banasa in Mauretania which share the median ridge, lunate apertures and upper volutes (Boube-Piccot 1994, nos 284–96, 297–310 respectively).

Most unusual is the decoration running along the sides, a series of apertures creating a tracery of copper alloy. In general terms this piece is uncommon, incorporating features of a number of other common types. It is quite closely paralleled by an unprovenanced chape on display in the British Museum (GR.1975.5-18.2). The pierced decoration is particularly noteworthy, and relates it stylistically to the sword guards and other fittings embellished in the same way (e.g. **524–527**).

582

Iron and copper alloy chape
Provenance unknown
Yale no. 1934.459
Dura no. unknown
Height 60 mm, width 49 mm

A curious chape of composite copper alloy and iron construction; the side walls and bottom are of the former metal, the front and back plates of the latter. Exact details of construction are obscure in the absence of X-rays, as the object is heavily corroded.

This chape is unique at Dura in being rectangular. It flares slightly towards the base, which appears to have had three copper alloy projections, perhaps beads or spheres, one on each corner and one centrally. However, certainty is not possible due to the severity of the corrosion.

Most Roman chapes of this general form are in bone, but one or two iron or copper alloy examples are known. Perhaps the closest to **582** is one from the Saalburg (*SJb.* III, 20, pl. 2:2). Another from the same site is a piece in copper alloy which has beads on the bottom edge, as suggested for **582** (Jacobi 1897, 486, fig. 78:8). A similar chape was found at Lauriacum (*RLÖ* XI, fig. 14:10).

583

Copper alloy chape
Provenance unknown
Yale no. 1938.3115
Dura no. unknown
Height 51 mm, width 23 mm

A simple copper alloy chape, shaped like a flattened cone with a rounded tip, quite plain. Probably from a dagger.

584

Copper alloy chape
Provenance unknown
Yale no. 1938.3116
Dura no. unknown
Height 41 mm, width 22 mm

This small copper alloy chape is similar to **583**, but has a bulbous tip. Probably from a dagger, on the basis of its size. **583** and **584** may be from the sheaths of a late form of *pugio*, but equally need not be strictly 'military' at all. Good parallels are known from various sites in Europe, e.g. Saalburg (Jacobi 1897, 486, fig. 78:9–10; *ORL* B8, 64, nos 19–20, pl. XI) and Holzhausen (*ORL* B6, pl. VII, fig. 22).

Dagger scabbard plates

585

Copper alloy plate from a dagger scabbard
Provenance: E4-3
National Museum, Damascus
Dura no. F209
Height 47 mm+, width 49 mm, thickness 2 mm
Frisch and Toll 1949, pierced bronze no. 67

The chape end of a scabbard plate from a dagger (identified by M. Bishop). Similar pierced dagger scabbard plates are known from Kastell Kapersburg (*ORL* B12, pl. VII:7) and Zugmantel (*ORL* B8, pl. XI:6, 9, 10).

586

Copper alloy plate from a dagger scabbard
Provenance: N7-W2
Yale no. 1938.2135
Dura no. unknown
Height 43 mm+, width 28 mm, thickness 3 mm.
Frisch and Toll 1949, pierced bronze no. 68

Identified by M. Bishop. A pierced object from Lauriacum has similar side brackets which lead to a round plate at the end (*RLÖ* X, fig. 37). It bears the text AQVIS HE(LVETICIS) GEMELLIANUS F(ECIT). Other 'Gemellianus' scabbard plates are known from Kastell Feldberg (*ORL* B26, pl. V:5) and Thamusida in Mauretania (Boube-Piccot 1994, no. 432). Stockstadt has produced an interesting variant (*ORL* B33, pl. VII:64).

587

Copper alloy plate from a dagger scabbard
Provenance: D1-St
Yale no. 1938.2100
Dura no. I904
Height 46 mm+, width 23 mm, thickness 3 mm
Frisch and Toll 1949, pierced bronze no. 70

Identified by M. Bishop.

588

Copper alloy plate from a dagger scabbard
Provenance: D1-St.
National Museum, Damascus
Dura no. I904
Dimensions unknown
Frisch and Toll 1949, pierced bronze no. 80

Identified by M. Bishop.

Shields

Cumont's publication (1926) and the Yale archives and collection contain a substantial body of data on shields, including a number of largely complete shield-boards with the only complete examples of Roman shield painting so far discovered.

There is a total of twenty-one recorded shield bosses from the site, six fragments of iron reinforcing bars from the backs of shields and at least twenty-four whole or fragmentary shield-boards. The collection thus represents up to about fifty different shields. No shield was found absolutely complete; all the intact boards lacked bosses, and the oval plank shields also lacked other metal fittings.

Shield types

At least four different types of shield are represented archaeologically at Dura. The most common is the large broad oval shield, with its longer axis running vertically, constructed of thin planks or laths of wood. It was wielded by a single grip in the centre covered by a metal boss. At least thirteen of these boards are represented (**616**–**623** and **624**–**628**). It will be argued that almost all of the bosses come from this type as well. Cumont's famous 'map shield', ostensibly the painted facing from a similar piece (1926, 323–37, pls CIX–CX) is no longer believed to be from a shield at all (Arnaud 1988, 1989; Rebuffat 1986), and so is not included here.

The second type is the rectangular, or rather semicylindrical plywood shield. The complete board of this type found in Tower 19 is justly one of the most famous finds from the city (**629**). Another fragmentary example was found by Cumont (1926, 262; **630**) and an unpublished fragment of a third survives at Yale (**631**). Like the oval shield, this type was wielded by a single handle behind the central metal boss, at least one example of which was found (**609**).

The third form is more difficult to define, as neither of the two examples recorded can now be located (**633** and **634**). The shield-board was an oval, but judging from the orientation of the figured decoration on the face, the long axis was horizontal. It is not known how large these shields were. The sketches preserved at Yale show that this type lacked a central boss, although a system of (rivet?) holes around the centre indicates that these, too, were held by a single grip. Shield **633** was of plywood, again distinguishing it from other oval shields.

The last type belongs to a quite different tradition of shield construction, consisting of rough wooden sticks woven through a single sheet of rawhide. Three largely complete examples of these basically rectangular shields were recovered along with fragments of a fourth (**635**–**638**).

Many fragments of shields mentioned in the various *Reports* cannot now be traced in the Yale collections or archive. Consequently, the information recorded about them cannot be verified, and so the following discussion generally includes only what can be shown from the surviving objects.

Among the most important of the missing discoveries are the fragments of painted shields found in room F of the Palmyrene Gate (*Rep*. II, 7) and in the Tower of the Palmyrene Gods (Tower 1: *Rep*. II, 11). These were described as follows:

> Apparently they were made of three pieces of light wood (about 0.01 m thick) covered on both sides with leather. One of the side boards measured 0.80 m on the outer edge, 1.03 m in the center, and 0.15 m wide, the ends rounding up at the top and bottom. Fragments of the centre board, 0.16 m wide, seemed to place the total width at about half a meter. Fragments from the edge showed the leather folded over to run beneath the shield in some places. Other fragments showed the leather covering of both sides linked with small bands of leather 0.02 m or 0.03 m wide running over the edge. The threads of wool which bound the junction were still in place. Fragments of leather showed that one of the shields was brilliantly adorned with bands of blue, yellow, and red, 0.03 m to 0.05 m wide, separated by narrow bands of black, the decoration diversified in one part with a checkerboard pattern of bright yellow and red, the squares made about 0.01 m square.
>
> (*Rep*. II, 72)

These are quite clearly fragments of oval plank shields of the same general dimensions as those found in later seasons (**616**–**620** etc.). It is possible that some of these fragments are those here called **624**, but this identification cannot be proved.

'The remains of a wooden shield covered with painted parchment' were found in Tower 15 in the 1930–1 season (*Rep*. IV, 10). Fragmentary shields **625**, **626** and **631** are all in a box labelled 'shield fragments, 1930–31 season'. Some or all of them may be equated with the published note, but again certainty is impossible.

The Temple of Zeus Kyrios (Blocks M8 and N7) produced 'fragments of a wooden shield, the design representing part of a circular geometric decoration around the boss' (*Rep*. VII/VIII, 305).

Of particular importance is the fact that the Tower 19 countermine produced not only bosses and shield reinforcing bars but also fragments of boards of indeterminate shape, of both ply and plank construction (Fig. 14; *Rep*. VI, 197–204, figs 17–18).

Although Dura has produced by far the largest selection of shield-boards so far found on any Roman site, the sample is still small enough for other shield types to have escaped archaeological representation. The record of the little-understood bossless ovals (**633** and **634**) demonstrates that unfamiliar types were in use.The survival of five complete oval plank boards (**616**–**620**) buried in the embankment may overemphasize the importance of the type through this single discovery, but given the fact that so many of the fragments clearly belong to the same form it is likely that this type did indeed predominate.

Depictions of shields at Dura show a variety of forms. The clearest are those from the synagogue, where both large ovals and smaller, roughly hexagonal shields are seen (Plate 4; see

also the hexagonal enamelled shield-shaped stud **321**). Were hexagonal shields still seen at Dura-Europos into the third century AD, or are these drawn from depictions of an earlier age? In depictions, gods are usually represented with oval shields or small circular targes (e.g. the relief of Asadu: *Rep*. VI, pl. XXX:1; the dromedary god from the Temple of Adonis: *Rep*. VII/VIII, pl. XXXI:2). The latter type is often depicted in Palmyrene art in representations of horsemen or camel riders in local dress (Colledge 1976, pls 27, 37, 44, 129, 143). None of these small targes was found at Dura, but the bossless ovals (**633** and **634**) could be Romanized versions.

Shield boss (*umbo*) types

Of the twenty-one known bosses, fourteen are made of copper alloy and seven of iron, but the latter material is probably greatly under-represented due to differential rates of preservation. That many, perhaps all, of the copper alloy bosses certainly or probably came from the Tower 19 countermine proves that they were not considered too flimsy for combat and were not confined to parade shields.

Most of the bosses are circular or exhibit radial symmetry (e.g. **603–606**). Only one, now lost, had a rectangular flange (**609**). It is usually assumed that the latter type belonged to the rectangular form of shield, and that round bosses belonged to the lighter, usually oval, auxiliary shield. There may have been exceptions to this, but as a general rule it seems to hold well. The arrangement of decoration on the painted shields shows that it was true at Dura; the semicylindrical shield (**629**) has space for a rectangular boss, the oval shields (**616** and **617**) for circular ones.

The round bosses share the same basic form, with a roughly hemispherical bowl large enough to clear the fist holding the grip within. The flange around the boss is broad, in order to spread the stress of the (usually) four fastening rivets which attached it to the board. Within this general pattern there is considerable variation, both of shape and metal (iron, or copper alloy varying from a reddish metal to typical Roman yellow brass, probably with a high zinc content). The profile of the bowl is often quite low, especially among the iron examples, presumably due to the difficulties of forging a small, deep bowl. Others are actually ballooned outwards from the base (e.g. **603** and **604**). Boss **608** had a peculiar cylindrical projection of unknown function at its apex.

The complete bosses are basically circular in plan, except the rectangular **609**, and **591** which is distinctly ovoid. Most have simple annular flanges of constant width, but a few have their edges worked to produce an eight-pointed star in outline (**603–606**). The bosses were presumably made by spinning, except the ovoid **591** which bears the marks of a planishing hammer on its interior. This shows that it was made by sinking into a former rather than by raising over a stake.

Surface embellishment is confined to inscribed concentric rings, usually in pairs, except on boss **590** which has knife-cuts around the edges, and the small raised bosses around the points and edges of the star-shaped examples.

Many of the bosses at Yale lack provenances. On the other hand, the report of the excavation of the Tower 19 countermine shows clearly that many bosses were found there (*Rep*. VI, 194–5, 197, 204, figs 16–18). Except for **609**, there is no evidence that any bosses were found anywhere else, and those bosses which are provenanced come from the right area (L7-W; bosses **589**, **591**, **593**, **595**, **596**, **603**, **605** and **608**). **599** and **607** are explicitly stated to have come from the mine. It seems probable that all the bosses except **609** are from the mine.

Bossed oval shields

Construction of shield-boards of bossed oval shields

The following summary derives from inspection of the surviving examples (**616–628**), which show a degree of variability in construction (summarized in Fig. 92). However, all share a common basic assembly.

The shield-board is made of thin planks or laths of wood, identified as poplar (*Populus euphratica*). These vary considerably in width, are arranged vertically and glued edge to edge. The joints were very carefully planed to leave no gaps. In outline the complete boards are broad ovals, on average around 1.05 m high and about 0.90 m wide. They were apparently slightly convex, to a degree which cannot now be measured due to post-depositional distortion, but the centre probably stood about 100 mm away from the plane of the rim. This shape was presumably obtained by building up the board over a former. The thickness of the wood is carefully and systematically varied over the surface, from a maximum of 7–9 mm at the centre tapering to 3–5 mm around the edges. This is so consistent that it must have been finished after the board was assembled. However, preliminary thinning of the timbers will have helped them take up the appropriate curvature, which could have been set by steaming.

The board was presumably given this distinct convexity for the solid practical reason that a flat board of the same weight and thickness as a domed one is far less rigid and much easier to break.

Marks left by the tools used to work the surface of the wood include shallow facets from a very sharp axe or adze, and 'chatter-marks' (caused by a tool bouncing rhythmically as it is dragged over the surface) from a plane or draw-knife (Fig. 101). The oval outline would have been finished after completion of the shield-board when, on a number of examples, the edges were bevelled off.

It is clear that the apertures for the central grip were cut after the board was completed. Two holes were made, the lower usually a shallow trapezoid in outline, the upper a deeper semicircle to allow room for the knuckles and the back of the hand. This left a bridge of timber between, which formed the core of the grip. As this handle was horizontal, at right angles to the grain, it was far too weak to serve alone, and a sturdy iron grip assembly was added (p. 162).

All the preserved shields and fragments have remains of surface coverings, and most have at least traces of painting. Two distinct surface covering techniques were used.

The first (for example, on shields **621**, **622**, **624**, **624**, and **626**) consisted of a facing of very thin animal skin, so fine that it was described as parchment (Cumont 1926, 262; *Rep*. VI, 457). The species used is unknown; because of the fragmentary nature of the evidence it is not even clear if a single skin was enough to cover the whole shield (in which case the animal would probably be calf, as specified for *scuta* by Polybius, 6.23.3). It was probably applied wet and shrunk on by drying to fit the curved surface.

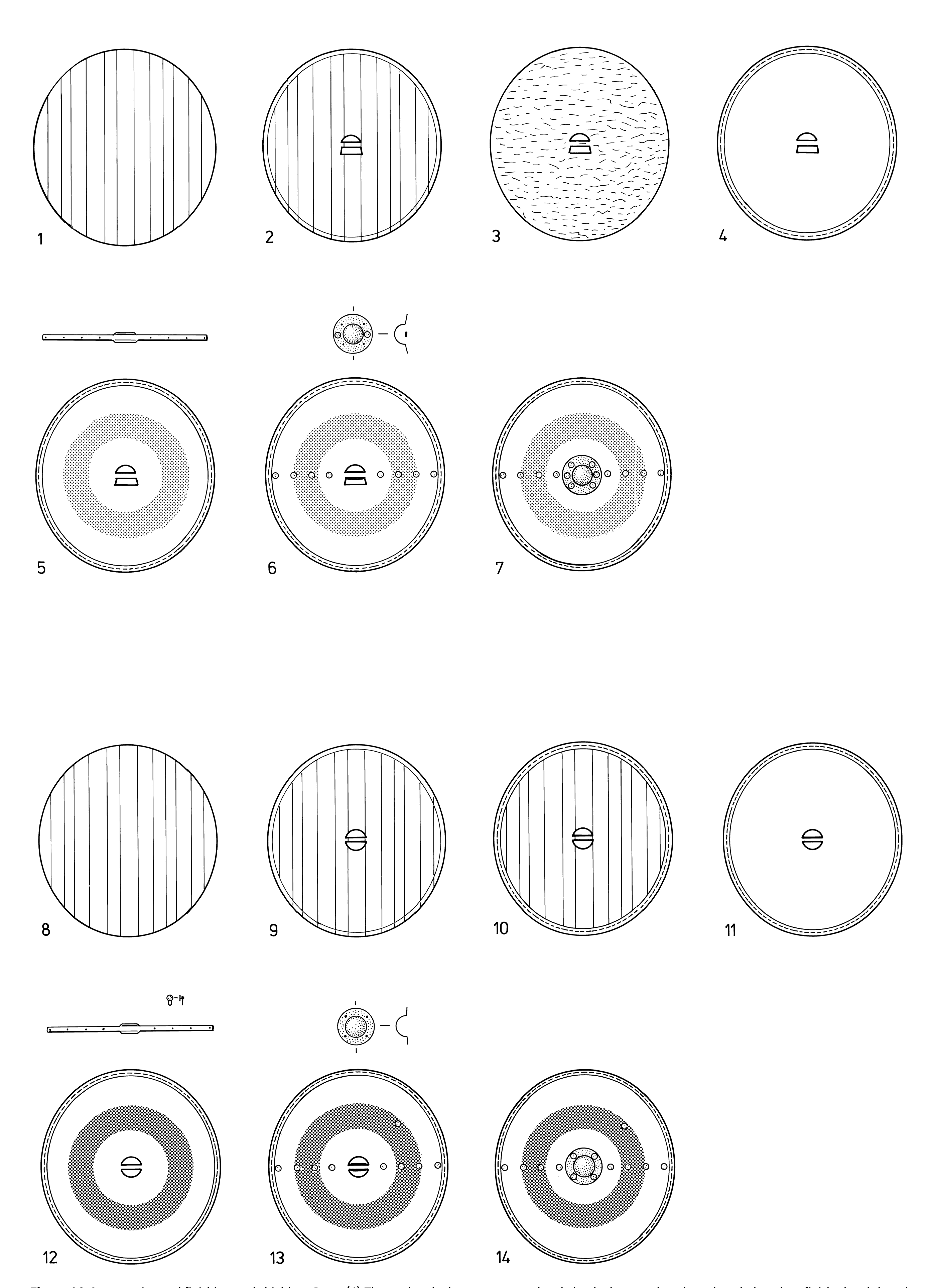


Figure 92 Constructing and finishing oval shields at Dura: (1) The poplar planks were prepared and glued edge-to-edge, then planed, the edges finished and the grip apertures cut. (2) A fibrous glue layer was applied (3) then the skin facing and the sewn edging (4). After painting both sides, a reinforcing bar was riveted to the back (5), and a boss attached to the front (6), completing the shield (7). Variants included different grip aperture shapes (9), and edging added before the facing (10). Instead of layers of fibrous glue and skin, the board is prepared with gesso (11) and painted prior to adding a reinforcing bar and perhaps a suspension loop (12), and boss (13).

Whatever the nature of the skin used, it was glued to both sides of the board. Between wood and hide was a thick layer of glue, into which was laid a pale, fibrous material, aligned roughly across the grain of the planks. The identity of this fibre has not been established. It is most likely vegetable in nature, but could be shredded tendon, a material of high tensile strength and elasticity used for making bows. The purpose of this material is fairly clear. Unlike plywood shields, plank boards are prone to splitting along the grain. A heavy layer of high-tensile fibre laid across each face served as a powerful split-retardant.

All the boards except the fragmentary **627** have stitching holes around the edge, 5–15 mm from the rim and 10–20 mm apart. Two twine threads ran through each hole, crossing over and running on opposite surfaces. It is not certain whether in some cases the stitching simply secured the edges of the skin facings. In at least some, if not all, examples the stitching fixed a strip of leather or perhaps rawhide, 20–30 mm wide, around the rim. None of these now survive *in situ*, but they were observed during excavation (*Rep*. II, 72). The edge of the wood needed a wrap-over binding as it was vulnerable to chipping and splintering from casual knocks and abrasions. However, this technique would not have significantly enhanced resistance to a deliberate blow on the edge of the shield.

The second method of facing (seen on shields **616**–**620**, **623**, **625** and **627**) did not employ a skin covering. In most, perhaps all, cases the surfaces again bore a layer of fibre in a glue matrix which, once set, was coated with a white plaster-like substance identified as gesso (*Rep*. VI, 368). This treatment sealed the surface of the wood and presumably hid the plank joints, giving a smooth unbroken surface for painting. The gessoed boards had the same stitching holes for a leather edging, which was sometimes added before the gesso and paint (**619**) and sometimes after (**617**).

A variant of the second technique exists, involving a layer of fabric glued to the surface, to which gesso was applied (**627** and **628**). The fabric presumably served the same purpose as the fibre layer, as well as providing a better surface for the gesso.

The painted decoration is discussed below.

Iron reinforcing bars/grips from bossed oval shields

As mentioned above, the wooden grip was too weak to serve alone. It is quite clear from a number of the oval plank shields that they had a strip of iron right across the shield, running along the short axis and along the wooden grip. None was found *in situ*, but the rivet holes for them were visible on shields **616** to **619**, usually four on each side of the centre, about 100–50 mm apart. This strip must have been on the back of the shield, because if it was in the front it would interfere with the fastening of the boss and obscure the painting. A number of pieces of iron are undoubtedly fragments of these strips, which served the double function of transverse reinforcement to the structure as a whole and a stout grip (**610**–**615**). The whole object can be reconstructed as an iron bar of roughly rectangular section, spanning the whole rear face of the shield and attached by eight widely spaced rivets, probably with broad heads to spread the load. In the centre, where the bar ran along the wooden grip core, the bar was flattened out on each side, forming a pair of 'wings' which were bent forwards to enclose the wood. The actual grip, then, was of iron and was fixed to the board in eight separate places, making for a sturdy structure (Fig. 97).

Attachment of bosses and fittings to oval shields

Most of the bosses have four holes for rivets spaced equidistantly around the flange. Few have rivets *in situ*, but those rivets which survive have broad flat or domed heads designed to spread stress (e.g. **595**). As none was found attached to a board, the specifics are unclear. For example, it is unknown whether the rivets were simply hammered over behind the board, or whether their shanks were pierced to take split pins allowing easy removal of the boss for maintenance (Oldenstein 1976, 73–4, nos 564–83, pl. 50; Boss B from Mainz has two such rivets *in situ*: Klumbach 1966, 172, fig. 3).

Lack of decoration or inscriptions makes it impossible to determine the orientation of most of the bosses, but **590** is exceptionally informative. Riveted to its rear side is a narrow iron grip bar. This would have sat on the front face of the wooden grip core, between the forward projecting 'wings' of the rear reinforcing bar (Fig. 97). If the whole assembly was wrapped in leather, as reinforcing bar **611** suggests, then boss, board and bar would have been even more tightly integrated.

Boss **590** shows that, at least in this case, the rivets holding it on were arranged obliquely in an 'x' formation rather than a '+', in order to keep them clear of the transverse iron bar. The same can be inferred for **591** on the basis of its shape. This was probably the standard arrangement, although the heavily damaged **597** may have had its rivets arranged as a '+'.

It is clear that only a proportion of bosses had the integral iron grip bar (**596**, **597** and **611**). Most of the rest definitely did not possess one.

Another fitting, traces of which remain on more than one shield, is a metal ring or loop, attached by a rivet above and to the (bearer's) left of the centre, probably for a hanging/carrying strap. A complete one was found with shield **616**; and the iron fastening pin for another is to be seen on shield **617**.

Semicylindrical plywood shields: construction

The one complete and two fragmentary rectangular shield-boards (**629**–**631**) share a common structure. The complete board from Tower 19 (**629**) was found in fragments but originally measured about 1.05 m high and 0.85 m wide around the curve. In fact, the board is not rectangular, being slightly longer down the centre than down the sides; the upper and lower edges are slightly curved. The chord width, measured from the untreated pieces on site, was recorded as 0.66 m. The curvature as now seen on the restored board is almost certainly wrong, being too tight. This is a result of the partial sacrifice of the structure for the sake of the painted surface, during conservation. The whole of the rear face is now covered in modern materials holding the structure together. (The dimensions of the shield found by Cumont, **630**, are unreliable, as the object was severely distorted by shrivelling.)

It is clear that all three semicylindrical boards were made of plywood. The two at Yale (**629** and the fragmentary **631**) both consist of three ply layers, each of very thin strips of wood, varying from 30 to 150 mm in width. The strips in the middle layer are arranged vertically, while those in the facing layers are

glued horizontally, i.e. running around the curve. The inner core layer tends to be a little thicker, 2–3 mm rather than the 1–2 mm of the outer layers, perhaps because they did not need to be curved. The result is that the thickness of wood on each orientation is roughly equal. The total thickness is 5–6 mm, although **630** may have been thicker unless it was made from only two layers. The wood of **629** is plane (*Platanus orientalis*). The rough surfaces of the wooden strips gave good purchase to glue. The whole assembly must have been built up over a former. The strips are so thin that they could probably have been bent to shape without recourse to soaking or steaming. After completion, the edges were carefully finished to give a smooth, even perimeter with a slightly rounded section. A central grip aperture was then cut. That on **629** is *c*.120 mm across. The handle on the latter was apparently just the thickened middle portion of a wooden strip running horizontally across the back of the shield and across the central hole. It had a 'lashing of heavy rawhide' on either side to strengthen it. This strip was one of a number forming a light framework on the back of the board. No trace of any of these has survived restoration, but a drawing made on site shows that apart from the central strip there was another strip along each side of the rectangle, about 90 mm in from the edge (Fig. 107). An identical system of strips is to be seen on **631**, probably glued and certainly pegged on with small dowels. Their purpose is obscure, as they are too light to act as braces or reinforcements, being 20 mm wide but only 2–3 mm thick. Neither can they have served to stop the ply springing apart, as this was done far more effectively by the stitching around the edge.

According to the published account, the surface of **629** was covered in 'thin red-dyed kid or parchment', overlain by a layer of fine linen to which the paint is applied. This is certainly wrong, as it is clear that the paint was laid directly onto the skin. It is argued that the order of the two layers has been accidentally transposed in the publication (see catalogue entry for details). Shield-board **630** also had skin facing, fixed on by a layer of fibre and glue. Board **631** had a layer of glued fibre, orientated across the grain of the wood (i.e. the fibres were laid on approximately vertically). However, **631** had no skin facing but a layer of gesso to which the paint was applied. These parallel the two methods of facing used on the oval shields.

The semicylindrical **629** had strips of leather 35–50 mm wide sewn over its edges. The stitching for such edging is still *in situ* on **631**, although the skin itself is gone. It was added after the gesso. As mentioned above, apart from protecting the edge of the wood from wear and tear the edging also prevented the ply from springing open. Extra pieces of leather were attached to the vulnerable corners of **629** with rawhide, but no trace of these is to be seen on **631**.

The boards were painted, apparently on both sides.

It is clear that **629** had had a boss fitted at some stage, but it was torn off before burial. It had been attached by four rivets, in the corners of its flange. The shank of one of these was still in the hole when found. All the holes have since been obliterated by the restoration. The space left for the boss in the middle of the decorative paintwork was a rectangle measuring 220 by 180 mm.

Oval shields without bosses: construction

Little can be said with certainty about the two known shields in this category as neither is in the Yale collection. Shield **633** was a fragmentary oval board of unrecorded size, with its long axis on the horizontal. It 'was made of the same sort of plywood as [**629**] and was apparently covered with cloth or parchment' (*Rep*. VII/VIII, 328, n. 1). The surviving sketch reveals its shape and orientation and the lack of a central grip aperture. The rim has the standard stitching holes for a leather edging strip. Shield **634** apparently possessed the same salient features.

Both boards may have had an arrangement of four holes in a rectangle around the centre of the board, probably to fix a single central grip to the rear face, although other arrangements cannot be ruled out. No further details of their construction are recoverable.

Wood and rawhide shields: construction

The essence of the structure of shields **635** to **638** is extremely simple. A large sheet of skin, presumably rawhide from its physical behaviour, was pierced with a carefully arranged pattern of slits. Through these were threaded roughly carved but straight sticks (48 in the case of shield **636**), 10–15 mm thick. (These have been identified as reed canes, but this is incorrect: *Rep*. II, 74.) The sticks were secured by wrapping the skin over their ends and stitching through between them. A similar technique was used down the sides. The structure was prevented from folding up by the attachment of one or two sticks across one end of the assembly, held on by folding the end of the skin over them before sewing.

Assembly would have taken place while the rawhide was wet. As it dried, it shrank and tightened around the wood, the whole structure becoming a rigid, lightweight defence.

The three largely complete examples (**635** to **637**) show a variety of sizes. Shield **635** was at least 1.55 m high and 0.8 m wide, while **636** and **637** were just over a metre tall and about half that in width. The latter pair were basically rectangular with a point at one end. The damaged end of **635** was also almost certainly pointed. It is not possible to tell which way up these boards were used. On balance, it seems probable that they were employed with the pointed end upwards, so that the shield could rest on the ground in a stable manner.

The distribution of the slits in the rawhide was carefully worked out to produce a pattern when the sticks were inserted. On **635** this resulted in a pattern of shallow, flaring 'W's, on **636** and **637** a series of 'V's.

A wooden baton, with twine around each end, was found in association with **635** though not actually attached to it. It is presumably the handle, but its original position is not known. On **636** there is a piece of twine tied around the seventh, eighth and ninth sticks from the left (when the transverse stiffeners are at the back). This might also be associated with the method of carrying.

None of the shields bear any trace of paint.

Shield decoration

Archaeological evidence for painted decoration on shields was, until recently, unique to Dura within the Roman world (Cumont 1926, 262–3, 327–37; *Rep*. VI, 456–66; VII/VIII, 326–69). The closest parallel was the poorly preserved

Hellenistic painted shield facing, with a simple border and traces of a central figure, from Aï Khanoum in Afghanistan, dated to the second century BC (Bernard 1973). It now appears than some simple traces of painted decoration are to be seen on fragments of shields from Masada (G. Stiebel, pers. comm.). Much more important are four fragmentary late Roman painted shields, believed to be from Egypt, recently identified in the collections of the University of Trier (Goethert 1996).

It has been speculated that the designs on the surfaces of Roman shields visible in various depictions might have been cut out of metal plate and riveted on (*Rep*. VII/VIII, 330; Webster 1985, 127). Indeed there is some evidence for this on the Doncaster shield (Buckland 1978; see also Van Driel-Murray and Gechter 1984, 36, n. 162). Tooled leather facings are also known from Vindonissa (Gansser-Burckhardt 1942, 74–9, figs 49–51). Clearly a variety of techniques were employed at different times and in different places.

Some analytical work has been done on the surface preparations and paints used at Dura, and it seems that at least three media were in use (*Rep*. VII/VIII, 368–9). On the Yale rectangular shield (**629**), the encaustic technique seen on Egyptian mummy portraits was employed, with the colours applied directly onto the skin facing (*Rep*. VI, 457, n. 60). The resulting waxy surface would have served as a useful weatherproofing (it rains heavily at Dura in the winter: see Hopkins 1979, 118 for a graphic illustration).

The oval shields were mostly prepared with a gesso 'derived from a rather impure gypsum and probably some lime' (*Rep*. VII/VIII, 368). This was applied to the wood to take the paint. On many fragments of shields a parchment-like covering replaced the gesso. The paint was either in a water-based or tempera (egg-white) medium. One based on casein (protein derived from curdled milk) also seems to have been employed (*Rep*. VII/VIII, 368–9).

Various pigments and dyes were identified with a greater or lesser degree of certainty, including vermilion, carbon black and 'a reddish yellow earth'. The dye indigo was extensively used (*Rep*. VII/VIII, 368–9).

The basic technique was to apply an overall base colour, usually red, to the gesso or skin covering, and then to overlay the detailed decoration. There is little to be gained by reiterating the detailed description and discussion of the individual shields already published. References to these may be found in the relevant catalogue entries. However, there is considerable room for discussion of the affinities of the designs.

The 'traditional' winged thunderbolt legionary symbolism is absent from the Dura rectangular shields (**629** and **630**; the design on **631** is almost obliterated). The thunderbolt is well known on first- and early second-century monuments (especially Trajan's Column: Florescu 1969, fig. 42; also legionary tombstones such as that of Gnaeus Musius at Mainz: Robinson 1975, pl. 468). An actual example of lightning-streak decoration may be seen on a first-century shield facing from Vindonissa, but the orientation is hard to understand (Gansser-Burckhardt 1942, figs 50–1). However, this motif is difficult to trace after the early second century, and it is quite possible that it was abandoned in the third century or even the second. It is virtually absent from the Column of Marcus Aurelius (except perhaps in one scene, Caprino *et al*. 1955, pl. V, fig. 10), but this may be because the designs were mostly painted on. We know almost nothing about legionary shield designs between the second and late fourth centuries, when specific unit designs are recorded in the *Notitia Dignitatum* (Seeck 1876). The veracity and trustworthiness of the shield patterns recorded in this remarkable document have been challenged (Grigg 1983), but I am not convinced that they are of so little value. Independent evidence for late designs discussed below proves that at least in general terms they are representative. Significantly, the winged thunderbolt is absent. It had passed out of use by the fourth century, and had probably vanished by the mid-third. Consequently, the design on shield **629** could well be legionary in character (*Rep*. VI, 463–5).

The published designs from Dura fall into two groups. Those on the rectangular **629** and oval shields **616** and **617** are essentially made up of concentric bands around the boss. The same basic geometry seems to have been shared by the shields discovered by Cumont (**621**, **622** and **624**). The wreath-like band around the centre is divided into eight equal parts, with its eightfold symmetry reflecting that of the star-shaped bosses.

Shield **618** is a rather different conception, with a single large human figure placed centrally, and apparently no concentric bands. The painting was lost around the edges, so there could have been a border (*Rep*. VII/VIII, 363).

Shields **633** and **634** share features of both types, with dominant central figures surrounded by concentric rings of decoration.

A third type, hitherto undescribed, appears on the back of shield **617**. It is fragmentary, and as the shield cannot be turned over was very difficult to study (see catalogue). However, it proved possible to record it via a photomosaic, from which a reconstruction has been painted (Fig. 98; Plate 8). The design is radial and consists of eight spokes, each made up of several heart-shaped motifs. This again echoes the eightfold radial symmetry seen elsewhere in the shield material.

There are obvious affinities between these designs and those depicted on auxiliary shields on Trajan's Column. The wreath-like band around the centre on shields **616**, **617**, **629**, **633** and **634** is reminiscent of the laurel crown around the boss on a number of the Column shields (Fig. 93:1–10). The basic conception of the design on the rectangular shield, a 'wreath' with an eagle above and a lion below, is almost identical to several Column shields, which have the wolf and twins or a space instead of the lion (Fig. 93:11–15). The stars which flank the lion and appear between the spokes of the design on the back of shield **617** are also common motifs on the Column (Fig. 93:3, 6, 20), and appear on the shields of the Praetorians on the Cancellaria reliefs (Bianchi-Bandinelli and Torelli 1976, no. 105).

Nothing on the Column parallels the fussy detail of the figural decoration of the 'Homeric' and 'Amazon' shields (**616** and **617**). There is no parallel for the 'Warrior God' shield (**618**) or the bold spoked design on the reverse of **617**. However, the heart-shaped (or ivy-leaf) motif does occur (Fig. 93:16, 17).

Many features are better paralleled on late third- and fourth-century depictions, and also the fragmentary examples of apparent Egyptian origin, now in Trier, believed to date from around AD 400 (Goethert 1996). For example, shields with large human figures as the main device occur on the Arch of Galerius

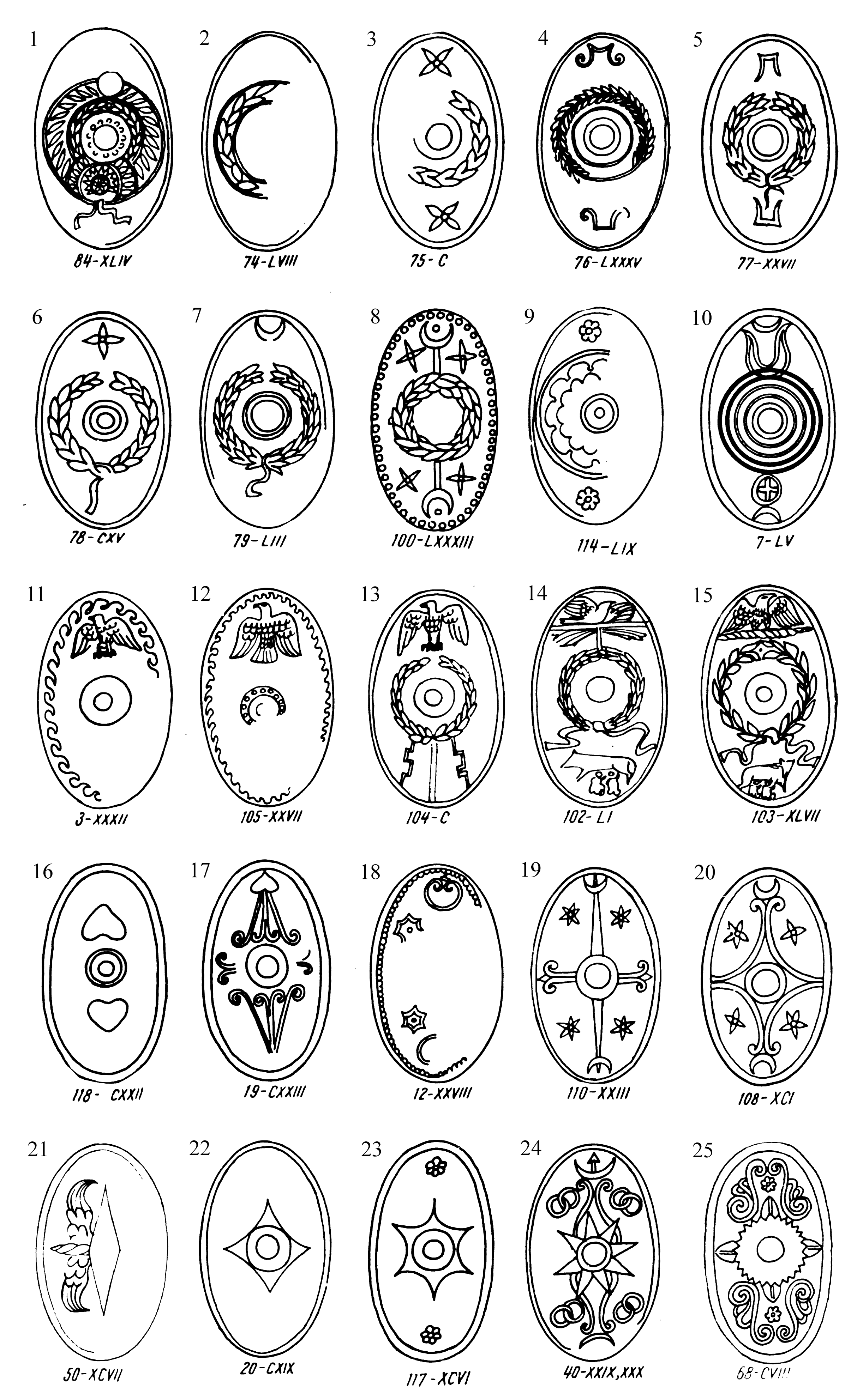


Figure 93 Shield designs from Trajan's column (after Florescu 1965).

(Laubscher 1975, pl. 34, 38 and 56) and in the *Notitia Dignitatum* (*Orientalis* 5.21, 24, 39, 60, 69). Shields with an eagle over the boss also occur in both sources (Laubscher 1975, pl. 42; *Notitia Dignitatum Orientalis* 8.7, 10). Figures above the boss flanked by victories, with animals at the bottom, also occur in the document (*Notitia Dignitatum Orientalis* 6.14–15). Winged victories crowning a figure above the boss (as on the rectangular **629**), and a field full of fighting figures, are seen on Trier Shield 3 (Goethert 1996, 119–23, figs 198, 203, 207–10). One of the shields on the Arch of Galerius also has a lion below the boss like shield **629** (Laubscher 1975, pl. 2), while another on the slightly later Piazza Armerina mosaics has a boar in the same place (Carandini *et al*. 1982, fig. 126). The Arch of Constantine bears a shield with a victory over the boss and an animal head motif below. The wreath-like patterns around the bosses of several Dura shields are closely paralleled on Trier Shield 2 (Goethert 1996, 116–19, figs 195–7, 199, 206).

The radial design on the reverse of **617** is a simple bright and bold geometric design which is particularly close to a number of *Notitia* designs. Bold concentric or radial designs are very common among the shields depicted in its pages. An actual shield with a ten-point star device has recently been identified at Trier (Shield 1, Goethert 1996, 115–16, figs 192–4). While none of the *Notitia* examples have spokes of heart motifs, a number have spokes of strange curvilinear form which may be a garbled form of a similar motif (*Notitia Dignitatum Orientalis* 7.7–8; 8.19). Bold, simple geometric forms may have been coming into fashion earlier in the third century. The tombstone of Flavius Trypho at Apamea shows an oval shield with a border and a bold cross motif (Balty 1988, pl. XIII:3); however the depiction is crude and could represent some detail of construction rather than blazonry.

The shield devices found at Dura look back to the auxiliary designs of the second century, and foreshadow those of the late empire. Clearly the designs form a milieu which was already established in the early second century and which lasted to the beginning of the fifth, while other shield designs like the thunderbolt went out of use.

A number of intriguing questions remain. How far were the shield patterns governed by personal choice, or were they unit-specific? Are the ornately decorated shields actually ‘parade’ pieces? Were fighting shields given a simpler, more easily recognizable motif? There is nothing inherently unlikely in the idea that the relatively uncomplicated design on the rectangular **629** is a unit design, perhaps belonging to a legion. The lion could well have been a legionary badge, in this case possibly *legio XVI Flavia Firma* or *III Cyrenaica* (*Rep*. VI, 463–5).

There is limited direct evidence that Roman regiments had their own distinctive shield badges. There is a record of Germans identifying Roman units by their shield devices in the fourth century (Ammianus 16.12.6). Claudian refers to ‘the brave regiment of Leones, to whose name their shields bear witness’ (*Bel.Gild*. 423). For an earlier but uncertain period Vegetius records that each cohort of a legion had its own distinctive shield (Vegetius 2.18). This makes sense as the cohort was the tactical unit, and under most circumstances it was more important to distinguish between cohorts than between legions. It may have been that each cohort had shields in a distinctive colour, but that all shared a common thunderbolt design. That the latter may have been legion-specific is suggested by two carvings from Mainz. The shield of the *aquilifer* of *legio XIV Gemina* whose tombstone predates the departure of the legion for Britain has exactly the same arrangement of wings, lightning and *tabulae ansatae* as seen on a shield in a relief from the *principia* carved after the return of the legion to Mainz in the Flavian period (Ritterling 1925, 1729–33; Körber 1912, 6). The shields with dominant single figures, **618**, **633** and **634** could also be unit specific, but it is hard to believe that whole cohorts had shields depicting Greeks and Amazons! These probably do indeed represent parade shields, or in the case of the first two shields, equipment for the cavalry sports described by Arrian in the *hippika gymnasia* (‘[Cavalrymen] also carry shields, not of the kind used for battle, but lighter in weight (since their exercises are directed towards speed and elegance) and multi-coloured [or ‘cunningly worked’] to look attractive’: Arrian, *Ars tactica* 34.5). Possession of display/training shields of course implies that some soldiers had at least two shields, a situation actually attested in a letter found in Egypt. A soldier, writing to summon his wife to join him at his posting, wrote ‘when you come, bring . . . my shield [*hoplon*] – just the new one – and my helmet . . .’ (*P. Mich*. 214; trans. Casson 1974, 177). Whether this was a new fighting shield or part of display kit is not specified.

It is possible that the buried, decorated shields were such second, parade or sports shields of this type (the Trojan and Amazon motifs on **616** and **617** would fit with such an interpretation, since helmets probably for the *hippika gymnasia* represent females, presumably Amazons, for the mock combats the games involved: Dixon and Southern 1992, 128). However, the simple design on the reverse of shield **617** may well be a regimental badge, normally painted on the front of fighting shields.

Shields at Dura

The two metal-bossed wooden shield types, the oval plank shield and the semicylindrical form, both clearly belong to the Roman tradition of shield-making. Shields wielded by a single central grip protected by a boss were typical of Celtic Europe, Germany and Italy in the first millennium BC (James 1979; Stary 1981; Todd 1975, 168). This contrasts with the well-known Greek *hoplon*, a bossless round shield attached at both fist and forearm.

Literature and depictions make it clear that there were two basic types of shield in use in the early imperial army. On the one hand there is the great semicylindrical shield, traditional armament of the legionary. This evolved from an earlier longer form, described by Polybius (1.22.5; 6.23.3) and depicted on the Altar of Domitius Ahenobarbus (Robinson 1975, pls 463–4). An apparent example has been found in the Fayum (Kimmig 1940). The rectangular form probably developed under Augustus (it appears on the reliefs on the mausoleum of Plancus, 20–10 BC: Fellmann 1957, 31). It is then depicted on military tombstones and monuments into the second century, most notably on Trajan’s Column.

The second type is really a group of forms, all of which were apparently lighter than the semicylindrical form. Most were oval, according to the monuments (e.g. on Trajan’s Column: Florescu 1969, fig. 42; on auxiliary cavalry tombstones: Robinson 1975, pls 298, 301–2), but long hexagonal forms are

also often seen (e.g. Trajan's Column: Florescu 1969, fig. 43). The archaeological record has produced evidence for oval shields (Groenman-van Waateringe 1963) and other shapes, especially a flat board with straight sides and rounded ends (Valkenburg and Caerleon: Van Driel-Murray 1988, fig. 2; and, dubiously, Doncaster: Buckland 1978).

These shields were apparently used by the auxiliary infantry and cavalry in at least the first two centuries AD. The contemporary technical term for them is obscure. The semicylindrical form is today often referred to as the *scutum*, but this term does not seem to have had such a precise technical meaning, and by the fourth century was used of the broad oval shields which already predominate at Dura. The terms *clipeus* and *parma* for shields other than the large rectangular type continue to occur in Latin authors up to the fourth century (e.g. Ammianus 29.5.39; 31.5.9), but may already have become literary archaisms by the Augustan period (Livy 8.8.3). Greek authors also describe the two types of shield. Josephus says that the *pedites singulares* carried the *aspis*, generally translated as meaning a round shield, but probably meaning an oval one here. The cavalry carried the *thureos*, a large flat shield, which was probably oval as it is clearly distinguished from the *thureos epimenes*, or rectangular shield of the 'rest of the phalanx', i.e. the legions (Josephus, *BJ* 3.94–7). In Egypt a common soldier writing to his wife used the word *hoplon* to describe his shield (*P. Mich*. 214). If there actually was a fixed Latin technical vocabulary for shield types, it is not yet recovered.

The two bossed types at Dura clearly correspond to the traditional division. However, due to the scarcity of comparable evidence, it is difficult to assess how typical the material is. This is especially true of semicylindrical shields, as no intact boards are known elsewhere. Leather facings from two possible first-century AD examples were found at Vindonissa, but these had rounded corners and may have been from flat shields (Gansser-Burckhardt 1942, 74–8, nos LV, LVIII, figs 49–53). However, the intact board **629** originally had a rectangular boss corresponding with the fine examples from Europe (especially the examples from South Shields: Klumbach 1966, 175, pl. 14; and Vindonissa: Klumbach 1966, 178, pl. 15; Thomas 1971, 36; Unz and Deschler-Erb 1997, no. 565), and its plywood structure also agrees with the description given by Polybius (6.23.3) as interpreted by Rostovtzeff (*Rep*. VI, 461). Shield **629** even corresponds with Polybius' description of the facing technique, with fabric first, then skin (*contra Rep*. VI, 461). Masada has also yielded a fragment of a plywood shield faced with a layer of textile covered with red-pigmented leather (G. Stiebel, pers. comm.), and a fragment of a plywood shield is known from Qasr Ibrim in Egypt (British Museum, EA 71844).

Pliny actually lists the best timbers for making a shield (*scutum*):

> the most flexible, and consequently the most suitable for making shields, are those in which an incision draws together at once and closes up its own wound, and which consequently is the more obstinate in allowing steel to penetrate; this class contains the vine, *agnus castus*, willow, lime, birch, elder and both kinds of poplar. Of these woods the lightest and consequently the most useful are the *agnus castus* and willow . . . Plane has flexibility, but of a moist kind, like alder; a drier flexibility belongs to elm, ash, mulberry and cherry, but it is heavier . . .
>
> (*Hist. Nat*. 16.77)

Shield **629** is of plane, and the plank shields are of poplar, corresponding well with Pliny's observations, which underline the deep empirical knowledge of the properties of materials available at the time. This knowledge was responsible for the adoption of plywood for strength, which certainly goes back to the late republic (the Fayum shield is of ply: Kimmig 1940), and if Rostovtzeff interpreted Polybius correctly, it was already in use in the third century BC. It was probably a standard technique, occurring again in the early empire at Doncaster (Buckland 1978).

Given this, it was somewhat surprising to find shields of simple plank construction at Dura, a technique until very recently unparalleled elsewhere. Why such an apparently weak technique was used is hard to explain, but I would suggest that it was a simple way to make a convex shield-board, the advantages of which may well have outweighed the abandonment of plywood. Generally, the early imperial shields other than the semicylindrical form seem to have been flat. This was the case with the Doncaster shield (Buckland 1978), and depictions seem to comply with the exception of the shield of the Mainz *aquilifer* (Robinson 1975, pl. 468). As the rectangular **629** shows, plywood can be made to curve in one direction, but it is much harder to curve it in two planes. Plank construction allowed the assembly of the required dome-like board, which has all the advantages of strength and rigidity over a flat board conferred by the form. The increased proneness to splitting caused by abandoning ply was probably largely offset by the tough fibre facing layers. There is thus no reason to think the plank shields too weak for anything other than ceremonial or training use (although special shields for the latter purpose, lighter than battle shields, were used by cavalry in the second century AD: Arrian, *Ars tactica* 34.5; 41.1). Fragments were found in the 'combat deposit' in the Tower 19 countermine.

That such construction was not confined to Dura is now apparently demonstrated by the shields of probable Egyptian origin, thought to date from around the end of the fourth century AD, recently identified at Trier. These fragmentary shields are very similar to the Dura ovals in their plank construction, size and shape (Goethert 1996, 116–18); although restored as circular in outline, their decorations make more sense as broad ovals, like the bulk of the Dura examples.

In general terms, it is increasingly clear that the techniques of manufacture seen on these shields at Dura were widely used in time and space. For example, Masada has produced shield leathers from oval shields, possibly a republican *scutum* in shape, and plywood board fragments with traces of gesso, fabric and leather, some with traces of reddish and bluish paint (G. Stiebel, pers. comm.).

The metal fittings are generally typical of contemporary Roman practice. The circular iron or copper alloy boss with hemispherical bowl and four fastening holes is a common type found in forts from Scotland to Syria (see James 1979, for gazetteer to 1979; also catalogue entry for **589**). Most of the Durene bosses are indistinguishable from European examples, even in fine detail. Overall, the group consists of a core of the standard type, with a number of more exotically shaped bosses (**603–606**). This general pattern is also seen in Europe. However there are important differences. The star bosses are almost unparalleled in Europe. If they occurred in the same proportions in Europe that they do at Dura, several should

have been found by now, but to date only one is known (see **603**). The type may therefore be a variant local to Syria. On the other hand, there are no pointed bosses at Dura. This type is well attested in Europe, but may also have been a localized variant confined to lower Germany (James 1979, 16). However, such regional differences may be more apparent than real; star-shaped bosses and other unusual forms may be depicted on Trajan's Column (Fig. 93:21–5). One of the fragmentary late Roman shields at Trier appears to have had a painted design in the centre consistent with an eight-pointed boss very similar to the Durene examples (Goethert 1996, Shield 3, figs 198, 203).

It was also disappointing that none of the copper alloy bosses preserved inscriptions or complex surface decoration such as are common on European bosses (Klumbach 1966; MacMullen 1960). However, the absence of inscriptions from the tiny sample of bosses in good enough condition to preserve them is not significant.

The association of the bosses and oval shields with iron reinforcing/grip bars is also paralleled in Europe, notably on the Doncaster shield (Buckland 1978). Fragments are known from many other sites (see catalogue). Doncaster appears to be unique in having a vertically-orientated grip; all the Dura examples, and the far earlier Fayum shield, have horizontal grips. I suspect that the Doncaster reconstruction might turn out to be erroneous, or at least questionable, if the evidence were to be reviewed, and that in fact Roman shields were always held by a horizontal grip.

A common find on European military sites is copper alloy edge-binding strip from shields (e.g. Colchester, *c.*AD 60: Hawkes and Hull 1947, 337, fig. 63; Hod Hill, Claudian: Richmond 1968, 114, fig. 57; Straubing: Walke 1965, 152, pl. 105). Metal binding was already in use in the time of Polybius (6.23.4; also Plutarch, *Camillus* 40.4) and was still known in Europe into the third century (Künzing: Garbsch 1978, 52, no. 17). It is completely lacking at Dura, where shields had a stitched leather edging. This could be an oriental variation (the much earlier Fayum shield also has leather edging: Kimmig 1940) but it is clear that metal bindings were not universally employed even in the West. The Doncaster shield lacks them (Buckland 1978).

It is particularly hard to assess how typical the Dura shields are in terms of shape and, above all, size. With such limited comparative archaeology we are forced back onto representations, with all their inherent pitfalls (pp. 42–6). For example, it has been said that the rectangular shields of the first two centuries AD seem to have been smaller than the Dura example, on the basis of representations. 'It rarely exceeds 0.85 m in length' (*Rep*. VI, 462, n. 75). However, this ignores the practice of reducing the size of the shield in depictions so as not to obscure the figure. Representations are no reliable guide to shield size, but are probably rather better for shape. With regard to oval shields, those actually found in Europe do include long ovals such as are found on Trajan's Column, but the known examples are often far larger than the depictions would suggest. Shield covers from Valkenburg represent boards up to 1.5 m tall (Groenman-van Waateringe 1967, 70, figs 16–17). The sizes of the Dura shields, then, are not exceptional.

On the other hand, the shape of the oval shields is obviously different from those found in earlier contexts or depictions, being much broader in proportion. They are actually identical in shape (and indicated size) to depictions of shields from the Tetrarchy and later times (e.g. the Arch of Galerius: Laubscher 1975; the Geneva silver dish: Toynbee 1964). Late shields were certainly convex. Ammianus describes them as '*patula . . . et incurva*', enough for soldiers to use them as floats to cross water obstacles (Ammianus 24.6.7). The development of such broad forms can now be traced back to the Severan period, for example on military tombstones in Istanbul (Fig. 24:D and E; Coulston 1987: tomb of an unknown individual, pl. 1; Aprilius Spicatus, pl. 2; Aurelius Surus, pl. 3), although the actual size of these shields is less certain: dimensions could be distorted, e.g. to apparent size shrunk so as not to obscure the bearer too much (as is probably the case with examples from Apamea, Syria: Fig. 25:A, C and F). This evidence suggests that the Dura oval shields were typical of their period.

It is virtually certain that the oval plank shields were used in the fighting. They are the predominant type at Dura, and parts of one or more were found in the Tower 19 countermine with the bodies (Fig. 14, 'shield slat' in D, and perhaps the 'planks' in A and B). It may be that the painted shields discarded under the rampart were regarded as valueless for fighting not because they were made of planks, but because they lacked the 'anti-split' layers of fibre/glue and skin covering.

So far I have deliberately avoided the question of attribution of the two shield forms to unit types. At first sight the semicylindrical shields may be attributed to legionaries (*Rep*. VI, 461) and the oval shields to auxiliaries, as both were in garrison at Dura in the third century (pp. 16–25). However, the situation is not so simple. The idea that there was a rigid distinction between auxiliary and legionary equipment has been largely fostered by the rather conventionalized scenes on Trajan's Column (compare with the metopes of Adamklissi); in reality things seem to have been more fluid than is usually thought. Of relevance here are the units of auxiliaries described as *scutata*, on the Danube (*CIL* XVI, 110, AD 154) and in Egypt (*ILS* 2611; *Notitia Dignitatum Orientalis* 31.59). The term simply means 'shielded', but since shields were standard equipment, the distinction may suggest that they were unusually equipped with the more enveloping semicylindrical body-shield.

The general picture gleaned from the monuments, and to some extent from the archaeological record, is that in the second century such distinctions of equipment as had existed were breaking down. Increasingly, legionaries are depicted with oval shields. In this respect, as also in armour and weapons, they were increasingly indistinguishable from auxiliaries. The semicylindrical form rarely appears at all on the Column of Marcus Aurelius (Caprino *et al*. 1955) and is completely absent from the Arch of Severus in Rome (Brilliant 1967). The impression that the rectangular type was increasingly redundant by AD 200 is confirmed by the appearance of oval shields on legionary tombstones of the period (Coulston 1983, pls 1–3). However, Cassius Dio mentions

semicylindrical shields in a third century context (*aspisi tais koilais tais solenoeidesi*, 'shields hollowed and channel-like', 49.30.1). This, and the appearance of such shields at Dura as late as the 250s, seems to contradict the representational evidence, but it may be that these shields stayed in use in the East longer because they were suited to local conditions, for example offering superior protection against arrows. (According to Caesar, one *scutum* stopped 120 arrows, attesting the strength and effectiveness of the big body shield: *BG* III, 53.)

Alternatively, some may have been retained specially for the *testudo* formation to which they were especially suited (Van Driel-Murray 1988, 58). It is in the *testudo* that they make their main appearance on the Column of Marcus (Caprino *et al*. 1955, pl. XXXIV, XLIX, LXI). The formation remained in use into the fourth century (Ammianus 16.12.44; 20.11.8; 26.6.16, etc.). The latest representation known to me appears on the Arch of Galerius, but it is unclear which side is using them in the battle scene (Laubscher 1975, 32, pl. 15:1)! Their appearance might be no more than antiquarianism. Finally, it is conceivable that they may have been retained for ceremonial use only, but the discovery of parts of at least four (shield-boards **629–631** and boss **609**) may imply general use at Dura. But were they used by legionaries alone? Only an inscription on a shield naming a unit could have proved the point.

The two basic shield types seem to have been closely related to the other weapons and modes of fighting. Traditionally, the legionaries fought in close order (Tacitus, *Hist*. 2.22), making a continuous wall of shields which were used to bunch opponents together where they could be dispatched by the short *gladius*, wielded in the confined space to thrust between the shields. This 'shoving-match' warfare is described in various passages (Tacitus, *Hist*. 2.42). On the other hand, the lighter shield was used in more open order fighting, in conjunction with spear or *gladius*, or increasingly in the second century, with the *spatha*. It was used offensively, the boss serving as a mailed fist (Tacitus, *Hist*. 4.29; Tacitus, *Ag*. 36; Livy, 9.41.118). It is difficult to see how a cumbersome body-shield like **629** could have been used with the long *spatha* which is the only Roman sword type attested at Dura.

Before leaving the unequivocally Roman shield types, it should be noted that no examples of removable shield covers were found. Such covers are mentioned by Caesar (*Gallic War* 2.21.5; see also Cassius Dio 61.3) and fragments have been identified at a number of European sites (Birdoswald: MacIntyre and Richmond 1934, figs 7:i, 8:8–9; Hardknott: Charlesworth and Thomson 1973; Valkenburg, Vechten and Velsen: Groenman-van Waateringe 1967, 52–73; Van Driel-Murray and Gechter 1984, 30–5; Valkenburg and Van Driel-Murray 1988 for Caerleon. See now also examples from Roomburgh near Leiden: Van Driel-Murray 1999). I believe that it is very likely that covers were employed at Dura (the elaborate shield paintings would not have lasted long without them). Their apparent absence may be due to the failure of the excavators to recognize them or to recover them, or to their unfortunate absence from any of the very localized microenvironments along the walls where they might have survived. Since the climate is very dry at Dura for most of the year, it may well be that shield covers were made of textile rather than leather.

Judging from the currently available evidence, then, the Roman shield types at Dura appear to be quite typical of mid-third- century imperial fashion. The apparent oddity and archaism of the semicylindrical shields is probably more due to our ignorance of the effect of local conditions, and to the limitations of the archaeological record elsewhere, than to any inherent 'old-fashionedness' in the East.

The third shield type at Dura, the bossless oval of unknown size (shields **633** and **634**) is difficult to parallel. The use of plywood in **633**, and the edge stitching and general aspect of the surface decoration of both examples show that the type is clearly related to the Roman tradition, and in these features probably derives from it. However, it is a type not definitely known elsewhere from archaeology, depictions or literature. Lacking any inorganic parts, it is unlikely to be archaeologically detectable in most soil conditions.

If the interpretation of the holes around the centre as fastenings for a single grip behind the centre is correct, then a connection with the local small desert targe is suggested. This is seen on many depictions at Dura and at Palmyra, whence it is clear that it is a local shield type with no boss but a single grip (Colledge 1976, pl. 27). These seem to have been used by horsemen and camel riders.

The best explanation of shields **633** and **634** is that they are Romanized versions of such bucklers, effectively hybrids both in structure and, in the case of **633**, in decoration. Its central figure is in the local style rather than the imported classicizing style of the bossed shields. Perhaps a shield of this form is to be seen in a depiction in the Temple of the Gaddé (*Rep*. VII/VIII, fig. 72).

The wood and rawhide shields represent a totally different tradition of shield design. It is reasonably certain that this tradition was already established in northern Mesopotamia a millennium before the fall of Dura. Shields of identical construction are shown on a number of Assyrian reliefs (Hrouda 1965, 24). A variety of forms and sizes are shown, including circular and rectangular shields, and much larger versions, the height of a man and standing on the ground for archers to shelter behind like a medieval pavise (also suggested by Wright 1963, 81). The technique was both very ancient and widespread. Shields of identical construction have been found in Siberian tombs (Rudenko 1953, pl. LXXXVII; 1960, pl. LXI; British Museum 1978, no. 30).

Such shields may well have remained in use in Mesopotamia up to the Roman period. Round ones, at least, seem to have been used by the Palmyrenes (Schlumberger 1951, pl. XLI; Colledge 1976, pls 27, 37, 44, 129, 143). They may have been used in Achaemenid Persia (Ghirshman 1964b, pl. 242), and it seems that later they were used by the Sasanians, even though depictions of Sasanian warriors show them without shields. This is probably because the heavily armoured cavalry needed no extra protection, and the horse archers could not carry a shield. However, Ammianus describes Persian shields, probably carried by their foot archers and low-grade levy infantry. They are described as 'firmly woven of osier and covered with thick layers of rawhide', which could easily be a slight misinterpretation of the Dura shields (Ammianus 24.2.10). The Durene examples could therefore have belonged to either the defenders or the attackers, or to both. Such lightweight and cheap arrow defences would have been valuable to both armies. Shield **635** would have been too large

for hand-to-hand fighting and was probably an archer's pavise (*Rep*. II, 75). Ammianus mentions Persian hurdles and mantlets of 'wicker', which may be identical to this (Ammianus 19.7.3).

In summary, there is a very high degree of similarity to shields from the north-western Roman *limites*. It is difficult to assess whether some of the perceived differences (e.g. in boss shapes, or the use of metal edging) should be explained in terms of chronological developments across the empire, local fashion or the incompleteness of the surviving archaeological record. The strange shields **633** and **634** certainly seem to represent Romano-oriental hybridization of equipment but, as ever, it is unclear whether these shields were actually made for Roman troops *sensu strictu*, or for Palmyrene levies or other local troops.

The rawhide shields (**635**–**638**) clearly are foreign to the Roman tradition, but once again, although literature makes it clear that Sasanian troops used such shields, their long-established use across the region, and the uninformative nature of their contexts (where known), make possible their use by Persians, local levies and even Romans as siege-fighting equipment.

Catalogue: Shields

Shield bosses

589

Circular copper alloy boss
Provenance: Tower 19 countermine (?)*
Yale no. 1938.3647
Dura no. F1149
Overall diameter 197 mm. Bowl diameter *c.* 115 mm, bowl height *c.* 62 mm, plate thickness 2–3 mm.
* Probably from the countermine at Tower 19, where a number of bosses were recovered (*Rep.* VI, 204, fig. 18).

A copper alloy boss with a hemispherical bowl and an annular flange which is very slightly downturned. Complete and in excellent condition.

There are four empty fastening holes through the flange, made from the front. These are not spaced equidistantly around the circumference, probably in order to increase the clearance between them and the line of the grip assembly (see **590**).

At the apex of the bowl is an indentation, perhaps from a lathe if this circular boss was made by spinning. The boss is decorated with inscribed rings, probably made while still on the lathe. From the centre outwards, there is a single ring followed by two closely spaced pairs on the bowl, and two single rings on the flange.

Best preserved of all the Dura shield bosses, it is hardly damaged at all beyond superficial corrosion pitting. The polished surface was presumably acquired after excavation. The colour of the metal appears to be yellowish, perhaps a high-zinc copper alloy.

Parallels for this boss are quite common (see James 1979, for gazetteer of bosses known up to 1979). Syria itself has produced one, from the cemetery at Emesa (a silvered example, from Tomb 11: Seyrig 1952, pl. VIII:2). Good examples include a second century AD boss from Zwammerdam (Haalebos and Bogaers 1970 and 1971) and an unprovenanced boss from Pannonia (Thomas 1971, 38, pls LVI–LVIII). There are a number of very fine examples with ornate surface embellishment from Mainz (Klumbach 1966) and from Pannonia (Thomas 1971, 31–3, pls XXXIX–XLV). Two of this general type are known from Volubilis (Boube-Piccot 1994, nos 28–9).

590

Circular copper alloy boss
Provenance unknown
Yale no. 1938.3648
Dura no. unknown
Overall diameter 206 mm. Bowl diameter 117 mm, height 67 mm, plate thickness 1–2 mm. Grip length 189 mm, grip section (mid) 16 by 6 mm*, (end) 26 by 6 mm.*
* Dimensions of grip exclude corrosion products. Measured from the metallic core at fractures.

The bowl is approximately hemispherical (tending towards conical), and has an annular flange. Attached to the back of the boss was an iron grip, complete when excavated but now broken into four pieces. There are four empty fastening holes through the flange. These were made from the front. Each was rectangular when made, measuring 7 mm by 4 mm, but originally had round-shanked rivets, 5 mm thick, forced through them. The holes are equidistantly spaced around the perimeter. Two other rivet holes exist, on opposite sides of the boss and midway between the adjacent rectangular holes. They are circular, about 5 mm across, and contain corroded iron rivets. The latter, which have heads 19 mm in diameter, attached the short iron grip bar to the back of the flange.

The surface of the boss has a light and fairly even patination. At the centre of the bowl is an indentation, 2 mm across and 1 mm deep, the result of manufacture by spinning on a lathe. There do not appear to be any inscribed rings. The edge of the flange is embellished with a series of knife-cuts or nicks, about every 5 mm, an unusual technique on bosses which is only otherwise attested on an example from London (James 1980).

The iron grip piece, held to the back of the boss by the two preserved iron rivets, is complete apart from some minor chipping. Significantly, there is no space between the boss and the grip for the shield-board. Clearly the iron bar was attached to the boss and the entire assembly was then riveted to the front of the board. Its thinness suggests that it is only part of the grip assembly, as it would have been insufficient on its own. This conclusion is supported by the structure of the shield-boards and reinforcement/grip bars preserved in the collection (see p. 162).

See **589** for general parallels. The unusual edge decoration is paralleled on a boss from London (James 1980). A boss from Lauriacum was found with a similar grip attached (*RLÖ* XV, 195, fig. 59:6), while holes on a couple of bosses from other sites are best interpreted as fastening points for the same thing (e.g. Mainz C: Klumbach 1966, 172, pl. LV; Butzbach: Simon and Baatz 1968, 193, figs 1–5).

591

Oval copper alloy boss
Provenance: Tower 19 countermine (?)*
Yale no. 1938.3676
Dura no. F1224
Oval in shape, 187 by 180 mm restored minimum. Bowl: an oval 111 by 180 mm, height *c.* 50 mm.
* Probably from the countermine at Tower 19, where a number of bosses were recovered (*Rep.* VI, 204, fig. 18).

Basically similar to **589** in form, but distinctly ovoid. It is complete, except for some chipping of the edge of the flange. There is considerable corrosion pitting on the outer face.

Four fastening points exist around the flange, all empty. These are roughly circular and about 5 mm across. They are not equidistantly spaced, but regularly positioned between the axes of the ovoid flange. Two have been recut, in slightly different positions, indicating that this boss was used on two different shield-boards, or perhaps had to be reattached to the same board following a repair; the new hole positions could be explained by damage caused to the original nail holes requiring new ones to be made in intact wood.

A lathe or compass mark is visible at the apex of the bowl. There are three concentric inscribed rings around it on the bowl, and a fourth, botched due to the acircularity of the piece, about 10–15 mm above the junction of bowl and flange.

The metal used was a reddish copper alloy, which is unusual, as is its ovoid form. The latter is best paralleled on an iron boss from London (James 1980). Its acircularity presumably precludes manufacture by spinning on a lathe, although it is apparently possible for a particularly skilled craftsman to produce objects of ovoid section using this technique (J. Paddock, pers. comm.). In fact there are clear hammer marks on the inside of the bowl, suggesting that it was made by sinking into a former.

There are two associated dents on the object, one on the bowl and one on the flange, probably as a result of a single blow. It is not possible to tell if this was due to a blow from a weapon, or an accident, or if it was a result of deposition (e.g. the caving-in of the countermine, if that is indeed its provenance).

592

Circular copper alloy boss
Provenance unknown
Yale no. 1938.3677, 3689 and 3691–4
Dura no. unknown
Overall diameter 220 mm. Bowl diameter 120 mm, height 58 mm. Plate thickness 1–2 mm.

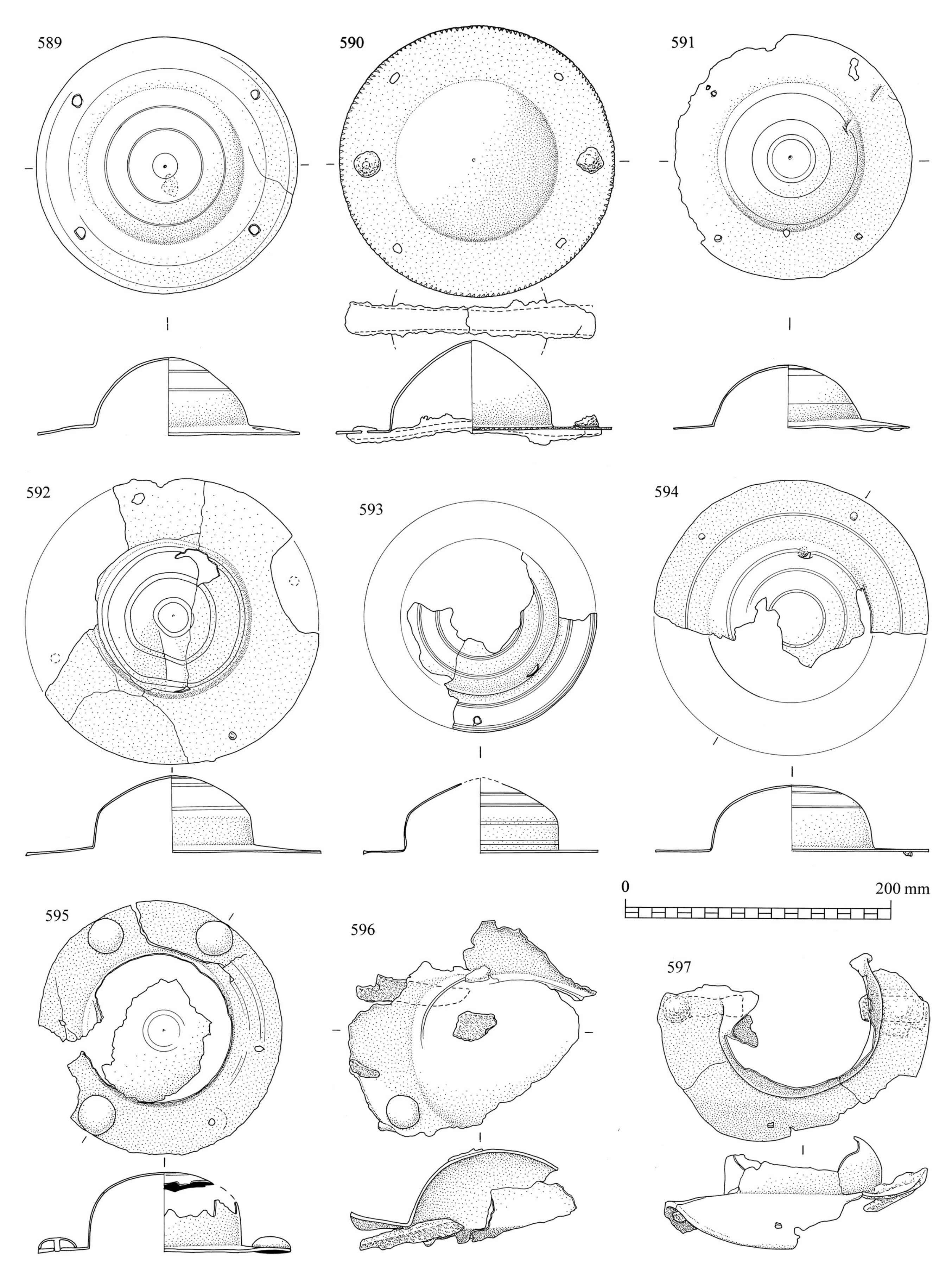


Figure 94 Circular shield bosses **589** to **597** (copper alloy).

Largely complete, but broken into six fragments. About a quarter of the flange and a small part of the bowl is lost. The bowl consists of a slightly tapering drum surmounted by a flattish dome, joined with a distinct carination. The flange is annular, relatively wide and slightly downturned. Corrosion is fairly light.

Only two fastening points survive, diametrically opposite each other and relatively near the edge of the flange. Both are empty, and of irregular outline. There were almost certainly originally four, the other two in the portions now lost. One may have been associated with the strange semicircular 'bite' taken out of one side of the flange, perhaps caused by its being torn from the shield-board.

The bowl is embellished with three concentric pairs of inscribed rings, but there are none on the flange. A broad dent in the bowl, with the mark of a sharp straight edge in the centre could be from a weapon blow.

593

Circular copper alloy boss
Provenance: Tower 19 countermine (?)*
Yale no. 1938.3680
Dura no. F1154
Overall diameter 175–80 mm. Bowl diameter *c.* 115 mm, height 55–60 mm. Plate thickness 1 mm increasing to 2.5 mm at edge.
* Probably from the Tower 19 countermine.

The bowl is a short drum which curves smoothly into a subconical dome. The flange is annular and relatively narrow. Less than half the bowl and only a quarter of the flange survive, as two fragments. However, the metal appears to be in perfect condition, with no traces of corrosion.

Only one fastening hole through the flange survives, although there are traces of a possible second one along one of the fractured edges. If the identification is correct the boss originally had the standard complement of four, spaced equidistantly about the flange.

Embellishment consists of concentric groups of inscribed rings, two groups of three on the upper bowl, two pairs around the sides of the drum and two groups of four around the flange.

594

Circular copper alloy boss
Provenance unknown
Yale no. 1938.3678
Dura no. unknown
Overall diameter 207 mm. Bowl diameter 115–20 mm,* height 50–5 mm.* Plate thickness 1–2 mm.
* Estimated, due to distortion.

Approximately hemispherical bowl and annular flange. About half of the bowl and flange survive, in a single piece. The bowl is distorted, being pushed over to one side, and bears a small dent which may result from a blow from a weapon. The surface is quite extensively corroded.

Two of the original four flange apertures survive. They are 5–7 mm across, and both contain heavily-corroded iron rivet shanks. No rivet heads survive.

Embellishment consists of concentric pairs of inscribed rings: three on the upper part of the bowl and a single pair on the flange.

595

Circular copper alloy boss
Provenance: Tower 19 countermine (?)*
Yale no. 1938.3700
Dura no. unknown
Overall diameter 190 mm. Bowl diameter 110–15 mm, height *c.* 60 mm. Plate thickness under 1 mm, rising to 2 mm at rim.
* Probably from the Tower 19 countermine.

Approximately hemispherical bowl, with annular flange. Three dome-headed rivets are still attached. The flange is almost complete, but about half the bowl is lost, probably as a result of the extensive corrosion seen on this object eating through the relatively thin metal of the central part.

The approximately planar flange retains its original six apertures, spaced in a roughly equidistant manner around the bowl. The three rivets which survive *in situ* have domed copper alloy heads 25 mm across. These are interpreted as three of the four rivets used for attaching the boss to the shield-board. The fourth head is lost, but part of an iron shank is still visible in the aperture. It is not clear whether this means that all the dome-headed rivets had iron shanks, or whether this one is a replacement. To my knowledge, these rivets are unparalleled outside Dura. Western shield rivets are flat-headed.

The two remaining holes are now empty, but were probably used for attaching a short iron grip bar directly to the back of the boss, as on **590**.

Embellishment is again confined to concentric inscribed rings. These are difficult to trace due to the degree of corrosion, but at least one pair was detected on the upper part of the bowl and two further pairs may be seen on the flange.

596

Circular copper alloy boss
Provenance: Tower 19 countermine (?)*
Yale no. 1938.3441 and 3685
Dura no. F1152
Original dimensions not measurable. Maximum preserved diameter 195 mm. Plate thickness 1–2 mm (measured at fracture).
* Probably from the Tower 19 countermine.

The bowl is hemispherical, with an annular flange. Part of an iron grip survives in position. Approximately half the boss is missing, and what remains is severely distorted and cracked, with a heavy corrosion layer.

Only one of the original four rivet holes for attachment to the shield-board has survived. It contains a dome-headed rivet similar to those on **595**, 25 mm across. Traces of at least one pair of inscribed rings are visible. The iron grip seems essentially the same as that on **590**, except that it was attached with a copper alloy rivet.

This object is too badly damaged to provide much further data. Adhering to its surface are two fragments of iron, one of which may be from another boss. This is consistent with the object being found in the tangled mass of bodies and equipment in the mine.

597

Circular copper alloy boss
Provenance unknown
Yale no. 1938.3687, 3688 and 3690
Dura no. unknown.
Overall diameter *c.* 210 mm, plate thickness 1.5–3 mm at edge. Other dimensions not measurable.

A hemispherical bowl with annular flange and fragmentary iron grip. Only about half the flange survives, and a small part of the bowl. It is badly bent and heavily corroded, with indications of burning.

Three fastening points in the flange survive. Two of these contain iron rivets for fastening a short iron grip bar to the back of the plate, as on **590**. Oxides from the heads of these rivets cover substantial areas of the flange. The remaining aperture is empty. Its position suggests that there may only have been four apertures in all, including those for the grip bar. This would be unusual, as bosses with an integral grip more commonly had six rivet holes. The iron rivets attaching the grip on this example may well have served a double function, transfixing not only the grip but also the shield-board with its iron grip/reinforcing bar.

The surface is too badly damaged to reveal any inscribed rings or other superficial decoration.

598

Fragment of circular iron boss
Provenance unknown
Yale no. 1938.5999.1075
Dura no. unknown
Maximum preserved length 147 mm, plate thickness 4–5 mm

Fragment of a circular boss with hemispherical bowl. A single, heavily corroded copper alloy rivet is preserved. Its head is flat, and is 18–22 mm in diameter.

For general parallels, see **589**. Iron bosses of the same general form are known from a number of sites including Newstead (Curle 1911, 182 and pl. XXXIV), Doncaster (Buckland 1978, 249, fig. 346, pl. XVI), Vindolanda (Jackson 1985, 130, fig. 47:1), Kastell Echzell (Baatz 1964, 48, fig. 13:15), Arnsburg (*ORL* BII 16, 22, pl.6:11–12), Pfünz (*ORL* BVII 73, 25, no. 19, pl. XV:14–16), Vindonissa (Unz and Deschler-Erb 1997, nos 566–8) and also from Dacia Inferior (Vladescu 1975, 51, fig. 30).

599

Circular iron boss
Provenance: Tower 19 countermine*
Yale no. 1938.5999.4656
Dura no. unknown
Overall diameter 154 mm+. Bowl diameter 120–5 mm, height *c.* 54 mm. Plate thickness 3–3.5 mm.
* Identified with a sketch on a site record card at Yale, which gives the provenance: 'L8–W (T.19 sap)'.

A circular boss with an annular flange, now shattered into several fragments. The flange is slightly downturned. See **589** and **598** for parallels.

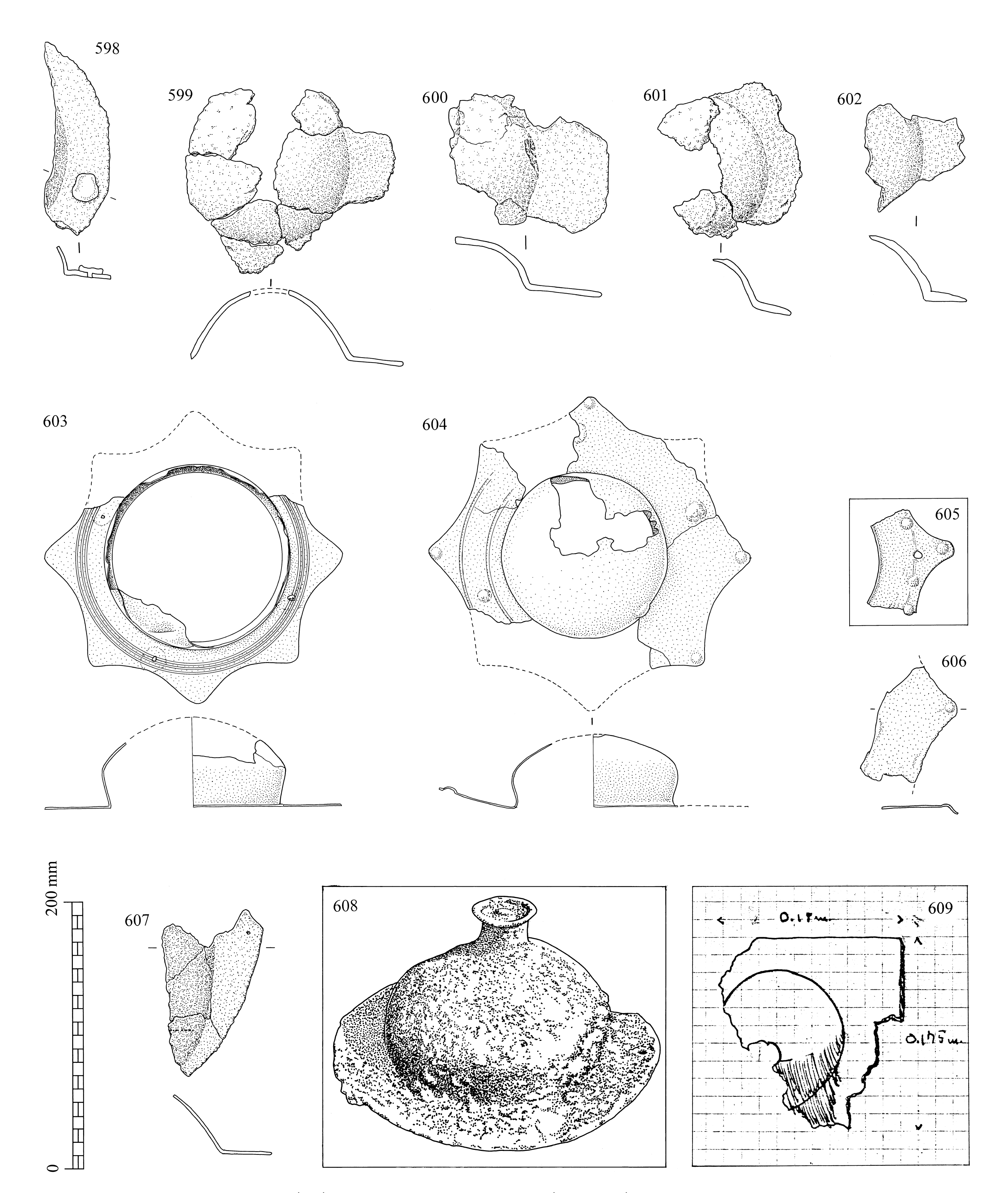


Figure 95 Circular shield bosses **598** to **602** (iron), star-shaped shield bosses **603** to **606** (copper alloy), fragment of iron shield boss **607**, copper alloy boss **608**, and square iron boss **609**.

600

Fragment of circular (?) iron boss

Provenance unknown
Yale no. 1938.5999.4659
Dura no. unknown
Maximum preserved length 118 mm, plate thickness 4 mm

Part of an iron boss with a hemispherical bowl and a particularly broad flange of uncertain outline. This is quite possibly a rectangular boss from a semicylindrical shield, but this cannot be proved. It is equally likely that the boss was circular in outline.

601

Fragmentary circular iron boss

Provenance unknown
Yale no. 1938.5999.4657
Dura no. unknown
Maximum preserved length 105 mm, plate thickness up to 6 mm

A large part of a circular boss with a hemispherical bowl.

602

Fragment of circular iron boss

Provenance unknown
Yale no. 1938.5999.4658
Dura no. unknown
Bowl height 50–5 mm, plate thickness 5–8 mm

Part of a circular boss with a hemispherical bowl.

603

Star-shaped copper alloy boss
Provenance: Tower 19 countermine (?)*
Yale no. 1938.3679
Dura no. F1146
Overall diameter 219 mm. Bowl diameter 135 mm, height 52 mm+. Plate thickness 0.5–1 mm.
* Probably from the countermine at Tower 19. Star-shaped bosses are visible in the published drawings of the deposits in the mine (*Rep.* VI, fig. 18).

The bowl is slightly ballooned, i.e. it expands from its junction with the flange, reaching its maximum width at about 26 mm above it. The profile then sweeps in, to form a flattened dome. In outline, the flange is an eight-pointed star. About 60% of the flange survives, but almost all of the centre of the bowl is lost. Corrosion is limited to a light, even patination.

Three of the original four fastening holes survive, spaced equidistantly about the flange in the narrow stretches between two points. Two have parts of (copper alloy) rivet shanks still *in situ*. Traces of the missing rivet heads are to be seen in the surface corrosion products. They were round, and were about 18 mm across.

The only embellishment, apart from the star-shaped outline, is a group of three concentric inscribed rings around the flange. These are unusually broad (*c.*1.5 mm) and shallow.

The sides of the bowl and flange bear concentric scratches, traces of manufacture, or at least finishing, on a lathe. It is not clear how the star outline was produced. Traces of the use of metal shears or files were not observed.

A further boss of this form was recently discovered at Dura, outside the Palmyrene Gate (Gelin *et al.* 1997, 42, fig. 32). A near-identical boss was also recently dredged from the Ljubljanica river in Slovenia (D. Bozic, pers. comm.; Gaspari 1999). Otherwise, the closest are an octagonal boss from Kastell Zugmantel (*ORL* BII 8, pl. XI) and a four-pointed star from Carnuntum (*RLÖ* II, 118, pl. XX:14).

604

Star-shaped copper alloy boss
Provenance unknown
Yale no. 1938.3496 and 3686
Dura no. unknown
Overall diameter 238 mm. Bowl diameter 125 mm, height *c.*55 mm. Plate thickness *c.*1 mm.

The bowl is ballooned like **603**. The flange forms an eight-pointed star in outline. About 40% of the flange and part of the bowl are missing. The flange is slightly bent. The surface exhibits considerable corrosion.

Each of the points on the star-shaped flange bears a small raised boss, made by pushing the plate out from behind. Each is about 8 mm across and 2 mm high.

Two certain rivet positions are known, located diametrically opposite each other. They are on the narrow parts of the flange, between two star-points. Both have traces of iron rivet shanks in them. Traces of a possible third aperture are visible at one of the fractures, but this is in an anomalous position and is in any case uncertain.

Two pairs of concentric rings are visible on the flange, but none appears on the bowl.

605

Fragment of a star-shaped copper alloy boss
Provenance: Tower 19 countermine (?)*
Yale no. 1938.5999.1123
Dura no. unknown
Dimensions unknown
* Probably from the Tower 19 countermine.

Fragment of flange from a star-shaped boss like **603** and **604**, recorded on a Dura record card and in a photograph at Yale (G765). The preserved point is more acute than those on **603** and **604**. It has the same terminal boss as the points on **604**, with additional ones around the curves between points.

A fastening hole survives, at the base of a point rather than between them as on **603** and **604**. A fragment possibly from the flange of such a boss was found in Turkey, 'a surface find at the base of the Kale (castle) on the Kerkenes Dag' (G. Summers, pers. comm.).

606

Fragment of a star-shaped copper alloy boss
Provenance unknown
Yale no. 1938.5999.1074
Dura no. unknown
Maximum preserved length 90 mm

Flange fragment of another eight-pointed star boss, very similar to **604** in its edge curvature and the small raised decorative boss at the preserved apex.

607

Fragment of iron boss
Provenance: Tower 19 countermine*
Yale no. 1938.5999.1073
Dura no. unknown
Maximum preserved length 128 mm
* 'L8–W (Tow.19 sap)', details from a site card at Yale.

A fragmentary object of peculiar shape, best interpreted as a boss. Bosses of unusual shape are known from the Trentholme Drive cemetery outside York (Wenham 1968, 95, fig. 37:12) and from Carnuntum, which has produced eye-shaped and rhomboid bosses (*RLÖ* III, 97, pl. VIII:8–9).

608

Circular copper alloy (?) boss
Provenance: Tower 19 countermine (?)
National Museum, Damascus (?)
Dura no. unknown
Dimensions unknown

Known only from a photograph at Yale (negative no. FVII 66). The print in the archives bears the following pencilled note: 'Number unknown but certainly from L7–W.' This object may be from the Tower 19 countermine.

The strange shape of the bowl is hard to parallel. A boss from Straubing with a large central hole may originally have had a similar projection fitted (Walke 1965, 152, pl. 106).

609

Iron boss
Provenance: G3–H5
Location unknown
Dura no. unknown
Dimensions unknown

A rectangular boss of the type considered to belong to the semicylindrical shield type. Known only from a site record card preserved at Yale, which includes a rough sketch and a brief description: 'Frag.[mentary] iron buckler *umbo* with square or rectangular border, badly rusted. 8 smaller fragg.[ments] with it.'

A number of such bosses are known from Europe. The best known are the copper alloy examples from the Tyne and Vindonissa (Klumbach 1966, 175–9, nos 3–4, figs 5–6; Unz and Deschler-Erb 1997, no. 565). There are also three iron examples from Carnuntum (*RLÖ* II, 118, pl. XX:11–13) and another from Aquincum (Hoffiller 1912, 64).

Shield reinforcing bars/grips

610

Iron shield reinforcing bar/grip
Provenance: Tower 19 countermine*
Yale no. 1938.5999.1076
Dura no. unknown
Length 490 mm+, section 22 by 12 mm, except at the tip (28 by 8 mm), and at the grip
* In photograph G810A, labelled 'near Tower 19, weapons from mine'.

Approximately half of an iron shield bar, in four fragments. Three join together, and it is clear that a very small portion has been lost between these and the fourth, for although they do not directly fit the corrosion and splitting patterns are very closely matched. The surface is deeply fissured and encrusted with oxides and concretion. However, the fractures, which probably occurred on or after excavation, allow the sections to be measured accurately.

Most of the bar has a roughly constant semicircular to subrectangular section. The outer end is somewhat flattened and widened. At the broken end, i.e. around its original centre, the bar was flattened and widened into two upward curving wings, resulting in a U-section at this point. This constituted the main grip of the shield, which lay across the central aperture of the shield-board, behind the boss, with the two wings projecting into the hole to enclose the wooden grip core and perhaps an iron grip bar attached to the back of the boss (see **590** and **596**).

It is estimated that the original length of the whole bar would have been about 970 mm, exactly the width of shield-board **617**.

The bar was attached to the rear face of the shield-board by a series of rivets, holes for which may be seen on a number of the surviving shield-boards. On oval plank shields such bars constituted a valuable transverse reinforcement behind the vertical planks. On this example, traces of wood grain are visible in the corrosion products on the appropriate side. However, these are neither parallel nor (as might be expected) perpendicular to the axis of the bar, but run in two

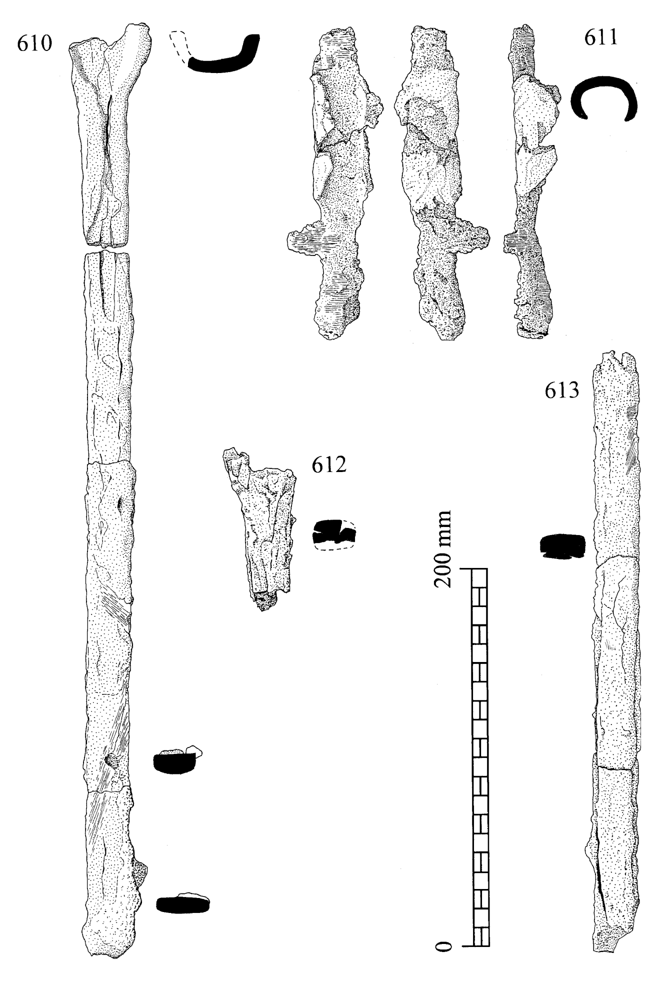


Figure 96 Shield reinforcing bars and grips **610** to **613** (iron).

different oblique orientations. One of these traces is pierced by what appears to be the remains of a rivet. This is not certain, but if the interpretation is correct, the explanation is that the shield-board belonging to this bar was indeed of plank construction, and that when the mine caved in it was shattered, causing one fragment of wood still attached to a rivet to rotate about the shank and come to rest at the angle we now see. There are no other clear signs of rivets due to the depth of corrosion, but the flattened end was certainly designed to take one. This is paralleled on a shield bar from Doncaster (Buckland 1978, fig. 4).

The best parallel is a shield bar from Carnuntum which possesses the same grip form (*RLÖ* III, 106, pl. IX:30–2). A further fragmentary example has been found at Vindolanda (Jackson 1985, 132, fig. 47:2). The Doncaster shield had a plain bar *in situ* (Buckland 1978, 249, figs 3, 4, 7). Other examples have been found at Newstead (Curle 1911, 182, pl. XXXIV) and Caerleon (Nash-Williams 1932, 76, fig. 28:11–13).

611

Fragment of iron reinforcing bar/grip

Provenance unknown
Yale no. 1938.5999.1977
Dura no. unknown
Length 167 mm+, section 16 by 8 mm at each end. Centre part widened.

Covered in a thick coat of oxides. The centre portion of a bar like **610**, comprising the section widened out on each side and bent into a U-section to form the main grip. The surviving part is now broken in two. Extensive traces of wood grain in the corrosion products show the position of the shield-board and the edges of the central grip aperture, into which the grip flanges projected. There are no traces of fastening rivets, which is not surprising as to judge from other pieces the nearest were probably set 120–50 mm either side of the centre to clear the 100 mm radius of the typical boss. The smooth coat of oxides around the back of the grip itself seems to preserve the surface texture and form of a leather binding.

A similar piece was recovered at the Saalburg (Jacobi 1897, pl. XXXX).

612

Fragment of iron reinforcing bar/grip

Provenance unknown
Yale no. 1938.5999.1079
Dura no. unknown
Length 87 mm, section 22 by 12 mm+

Part of a shield bar from the point where it flared out to form the grip. Heavily corroded and flaking.

613

Fragment of iron reinforcing bar/grip

Provenance unknown
Yale no. 1938.5999.1078
Dura no. unknown.
Length 319 mm+, section 22 by 13 mm

Part of a bar in three pieces. Heavily corroded and split. Traces of wood grain in the corrosion products, but it is unclear whether these represent the shield-board. The variety of orientations suggests they do not.

614

Fragment of iron reinforcing bar/grip (not illustrated)

Provenance: Tower 19 countermine.
Yale no. 1938.5999.1081
Dura no. unknown
Length 104 mm+, section 23 by 12 mm

Identified among objects in Yale photograph G810A, labelled 'near Tower 19, weapons from mine'. Broken at both ends.

615

Fragment of iron reinforcing bar/grip (not illustrated)

Provenance: Tower 19 countermine
Yale no. 1938.5999.1080
Dura no. unknown
Length 85 mm+, section 25 by 10 mm

As **614**, identified in photograph G810A. Broken at both ends.

Shield-boards

616

Oval wooden plank shield (shield I, the 'Homeric shield') (Plate 6)

Provenance: embankment N of Tower 24
Yale no. 1935.551
Dura no. unknown
Height 1.18 m, width *c.* 0.95 m, thickness 5–12 mm

One of three painted wooden shields found buried in the embankment behind the walls, and already published in detail (*Rep.* VII/VIII, 331–49, 369, pls XLI–XLII). The publication concentrates heavily on the decorative painting of the outer face of the board. Sadly, this is now almost totally obliterated, apparently due to the discoloration and bubbling of some kind of binding medium applied to hold the pigments in place in the 1930s. The paintings were already in an advanced state of decay in the 1940s (S. Matheson, pers. comm.). Much of the pigment has now flaked off.

The wood of the shield-board is in good condition. The board consists of small planks of poplar (*Populus euphratica*). Comments here are confined to corrections and refinements of the published description. The board was made of thin planks, orientated vertically, glued edge to edge. Originally there were about a dozen, perhaps thirteen, 50–100 mm wide, tapering in thickness from 10–12 mm thick in the centre to 5 mm at the edge.

The basic shape is a broad oval, and the shield seems to have been convex. The degree of convexity cannot be accurately measured due to post-depositional distortion of the wood. There is a central aperture for a hand grip, originally designed to be covered by a metal boss, space for which was left in the painted decoration. The latter implies a circular boss of up to 207 mm diameter, which accords well with those actually recovered from the city. However, there were no nail holes for its retaining rivets, demonstrating that it had never been attached.

According to the published account, shield I retained four rivets when found, 'placed without relation to an *umbo* and [which] must have served some other purpose' (*Rep.* VII/VIII, 330). Two were on the transverse axis of the oval, *c.* 140 mm either side of the centre, too far out to be *umbo* rivets. Another was allegedly on the right upper edge of the space reserved for the *umbo* (i.e. the bearer's right), and is shown in this position in the reconstruction (*Rep.* VII/VIII, pl. XLII). This is erroneous. There was never a rivet in this position, just the impression left by one belonging to another shield-board which had lain on top of **616**. The fourth rivet was 330 mm 'above and to the [bearer's] left of the center'. This peculiar arrangement of rivets was interpreted in terms of fixings for

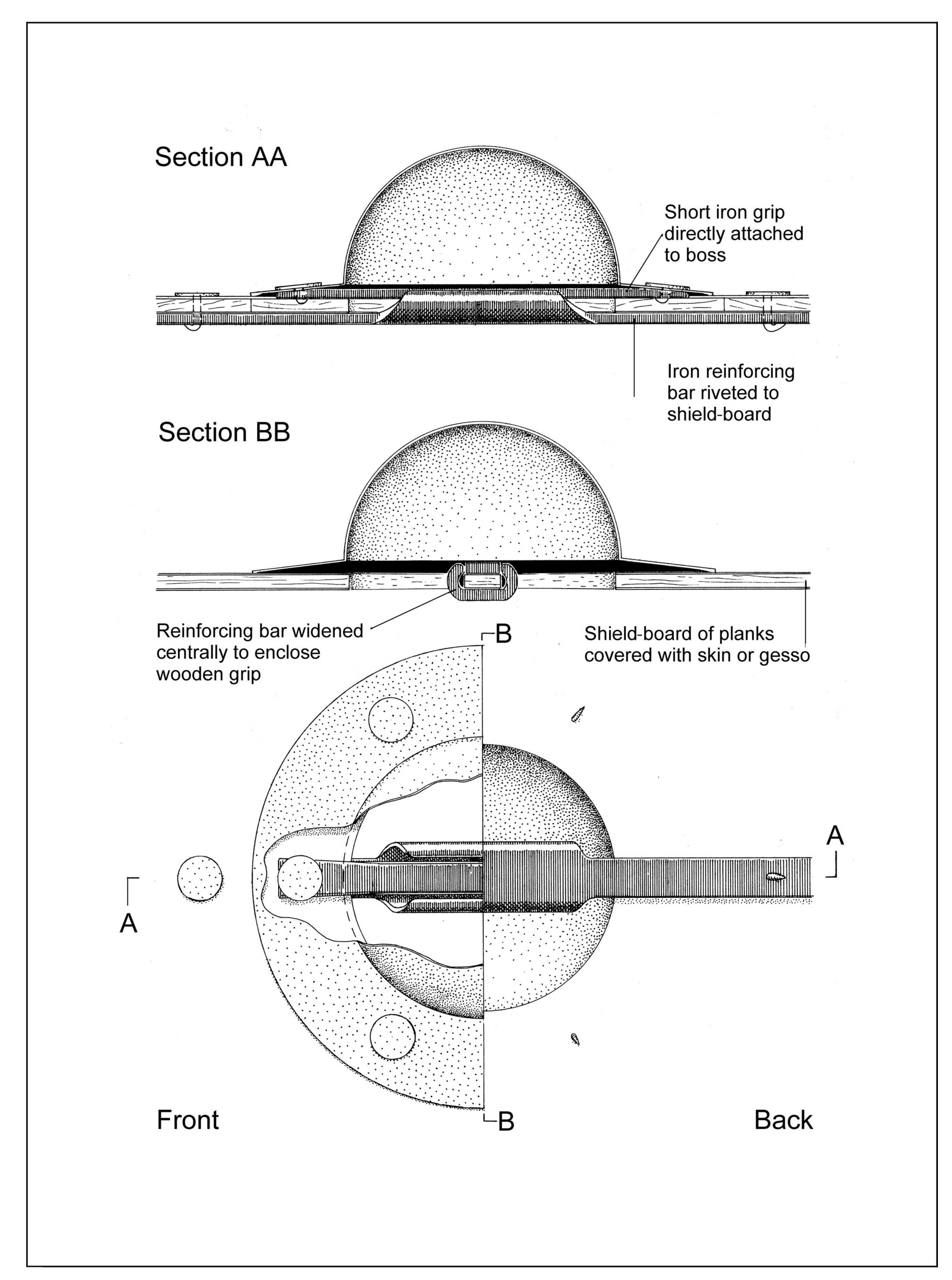


Figure 97 Diagram of shield boss and reinforcing bar assembly.

a grip and forearm strap, which is out of the question as the shield was designed to have a boss. Such shields were wielded by the central grip alone, and could not and did not have forearm straps. In fact, the fourth of the rivet holes described is associated with a metal object, not mentioned in the report, which fits the hole perfectly. It is an iron loop holding a flat articulating copper alloy ring to the back of the shield. This was probably intended to take a loop or strap to allow the shield to be hung up or slung over the shoulder when not in use. An attachment for a similar fitting was observed on shield II (**617**).

The two rivets on the short axis of the shield are easily explicable. They are two of the fastening points for the iron reinforcing bar/grip which ran across the rear face of the shield. It had been torn off prior to burial. It is worthy of note that the outer portions of the board, where additional rivet positions would be expected, are broken and missing on each side. The original painting of the shield in *Rep.* VII/VIII, pl. XLII (Plate 6) clearly shows the central portions of two planks missing on the right side (the bearer's left); these areas were probably ripped away when the iron bar was yanked off the back.

The painted decoration seems to have been applied to the surface after the latter had been prepared with a coat of gesso, to fill the grain and disguise the joints between planks. The edge has a series of small holes all the way round, which other finds confirm were to take twine stitching, presumably to hold a leather edge-binding. The purpose of such a binding would be to prevent the wood being damaged by casual knocks and bumps. It would be too flimsy to resist a deliberate blow.

A detailed description and art-historical discussion of the painted decoration was published in *Rep.* VII–VIII, 331–49. It comprises decorative bands around the boss and a border round the edge, between which are figural scenes clearly representing episodes from the Trojan War. The lower part of the shield depicts the wooden horse in front of the walls of Troy. The upper part of the field shows the sack of Troy. The decorative scheme is clearly connected in conception and execution with other known representations of this central theme of Greek literature in a variety of media, including sculpture and manuscript illumination (*Rep.* VII–VIII, 342–9).

There are no very close archaeological parallels to this and the other large oval shields from Dura, but representational evidence shows that they were a common form during the third and fourth centuries, apparently gradually replacing the earlier narrower ovals, semicylinders and other shapes attested from the archaeology and elsewhere.

A very few more or less intact Roman shield-boards have been found, including the Doncaster example (Buckland 1978) and the Fayum shield (Kimmig 1940, where it was misidentified as Celtic). The closest parallels are four fragmentary late Roman painted shields, thought to be from Egypt, recently identified in the collections of the University of Trier (Goethert 1996). Believed to date from around the end of the fourth century AD, these remain as leather facings, originally attached with animal glue to wooden shield-boards, which now survive in fragments. Shield 1 was 1.03 m diameter, made of wooden laths 45 mm wide, no thickness given, apparently aligned vertically (Goethert 1996, 116). Shield 2 has planks 40–60 mm wide and 6 mm thick, and an estimated diameter of 1.08 m (Goethert 1996, 118).



Figure 98 Composite photograph of the back of shield-board **617**. The fragile state of the shield meant that it could not be turned over. To produce a photograph of the unpublished painted rear face, the several fragments had to be laid on perspex and photographed vertically upwards from below, then a composite image constructed. Substantial parts of the radiating rows of white and red 'heart' or ivy-leaf shapes may be discerned; for a full colour reconstruction, see Plate 8. The shapeless mass to the right of the grip aperture is material from early conservation treatment.

617

Oval wooden plank shield (shield II, the 'Amazon shield') (Plates 7 and 8; Fig. 98)

Provenance: embankment N of Tower 24
Yale no. 1935.552
Dura no. unknown
Height 1.17 m*, width 0.97 m, thickness 3–7 mm
* Given as 1.135 m in *Rep.* VII/VIII, 349.

The second of three painted shields found stacked together in the embankment, published in *Rep.* VII/VIII, 349–63, 368–9, pls XLIV–XLV).

The shield is in much the same physical condition as **616**, i.e. the board is intact as found but the painting is all but lost. The broad oval board is made of thirteen poplar planks of widely varying width, glued edge to edge and orientated vertically. The board is 7 mm thick in the centre, thinning to a mere 3 mm at the rim. It is said to have been dished (*Rep.* VII/VIII, 328), but the planks are now too distorted to measure this, or indeed to permit absolute certainty that it was convex. The edge lace holes, 6–8 mm in from the edge and 10–12 mm apart, were for twine stitching to hold a leather edge-binding. Both twine and leather are gone. The paint underlay the position of the edging, and so had been applied first. Before painting, the surfaces of the board had been covered in gesso. There were also traces of the fibrous material in a matrix of glue seen on the surfaces of many of the other recovered fragments of shield-boards. The relationship of this material to the gesso is obscure, but the gesso is likely to be on top. The painting on the outer face left room for a circular *umbo* up to 193 mm diameter, but the absence of rivet holes shows that it was never attached.

A single iron nail shank survived 150 mm to the (bearer's) left of centre, on the short axis of the oval. This was almost certainly one of a series holding the transverse iron reinforcing bar/grip to the back of the board. This proves that the bar had been added, but had been removed before burial. It had overlain the painting on the back. Another iron shank stuck in the board survives above and to the bearers left of centre, about halfway along the radius. It is curved over into a loop. It is very similar to the 'strap attachment' on **616** and is in the same position, so it possibly performed the same function.

A detailed description and art-historical discussion of the painted decoration was published in *Rep.* VII–VIII, 349–63. Like the 'Homeric shield' **616**, it comprises decorative bands around the boss and a border round the edge, between which are painted figures, although these are more evenly distributed around the space rather than being concentrated into two distinct scenes, and more of them possess labels in Greek. The figures, individuals and duelling pairs, portray Greeks and mounted Amazons, another popular theme in Greco-Roman art (*Rep.* VII–VIII, 357–63).It is noteworthy that some 'cavalry sports' helmets bear female features (Dixon and Southern 1992, 128); this shield may well have been primarily intended for the same purpose of training and ritualized display.

The most important new observation about this piece is the painted decoration on the back (Plate 8). The original publication alluded to it, but gave no details (*Rep.* VII/VIII, 326). Given the state of the front of the shield, which is now in pieces, it was not possible to turn the timbers over. Consequently, the design had to be examined and photographed by laying a few of the timbers at a time on a sheet of Perspex and examining them from beneath, to create composite photograph (Fig. 98). The result is quite unlike any of the previously published shield designs from Dura. On an overall blue ground, lines of 'hearts' in red and white radiate nose to tail from the centre, a decorative element reflected in the 'wreath' on the front of the shield. Originally there were eight lines, at roughly forty-five degree spacing. In between each line and its neighbour was an eight-pointed red and white star.

The most noticeable features of this design, which differentiate it from the others, are its boldness and simplicity. Most of the other designs have a lot of fine and fussy detail, of figures, animals and foliage, etc. This design consists of large, bold elements.

Heart shapes, or perhaps more accurately ivy-leaves, similar to those in this design occur on Trajan's Column (Fig.93:16–17), demonstrating that they were used by shield decorators over a century before the time of the fall of Dura. However, they seem to have been unusual, and in fact the Dura shield is more closely related to a number of shield designs in the *Notitia Dignitatum* of around AD 400 (Seeck 1876). These are commonly bold, bright, simple designs, presumably to aid unit recognition at a distance. They are often radial, and designs similar to this are known (e.g. *legio septima Gemina*, *legio decima Gemina* and *legio Iulia Alexandria*: *Notitia Dignitatum Orientalis* VII, 7–8; VIII, 19).

618

Oval wooden plank shield (shield III, the 'Shield of the Warrior God') (Plate 9)

Provenance: embankment N of Tower 24
Yale no. 1935.553
Dura no. unknown
Height 1.18 m, width 0.94 m, thickness not measured

The third of the three painted shields found together in the embankment and already published (*Rep.* VII/VIII, 363–8, pl. XLVI). Like **616** and **617** it is made of thin planks, apparently poplar, glued edge to edge and orientated vertically.

A detailed description and art-historical discussion of the painted decoration was published in *Rep.* VII–VIII, 363–7. The design is quite different from those on **616** and **617**, consisting of a single figure filling much of the oval field, with no band of decoration round the boss. It is possible that there had been a narrow border around the edge of the board but, if so, no trace survives. The subject matter also distinguishes this shield from the other two. It appears to be an Eastern warrior deity, although the figure is not sufficiently well preserved, nor provided with unambiguous attributes, to allow him to be precisely identified.

There is little to add to the published description, beyond noting the decay of the painted decoration which is much the same as that seen on **616** and **617**. The board had never had a boss attached, although the usual central aperture proves it was intended to have one. Like **616** and **617**, its iron reinforcing bar had been fitted but was subsequently removed before burial. The nail holes for it are clearly visible across the short axis of the shield. They were at 145 mm and 310 mm to the (bearer's) right of centre, and at 320 mm to the left. (At 150 mm to the left, the nail may have passed between two planks.) Other nail holes closer to the edges of the oval were not visible due to the state of those parts of the board.

The surface was prepared for painting with a coat of gesso on both sides. There are traces of paint on the back, but no recognizable design survives. Stitching holes to secure a leather edging are to be seen around the edge.

619

Oval wooden plank shield (shield IV)

Provenance: N8 W9 embankment
Yale no. 1938.5999.1107
Dura no. unknown
Height 1.15 m, width 0.95 m, thickness 3–8 mm
Cursorily published with the three painted shields in *Rep.*VII/VIII (327–8, fig. 83). A photograph of this shield *in situ* appears in Hopkins 1979, 187.

The *Report* states: 'Found in the fill of the first embankment . . . some 17.00 m south of the axis of the Persian assault ramp . . . Shield IV, was recovered practically intact, its planks still firmly glued together, wanting only its leather edging . . . It showed no traces of painted decoration.'



Figure 99 Shield-board **619**.

As it survives today, while the (bearer's) left side of the shield is almost perfect, the other is fragmentary. Most of the planks are now separate. The central aperture is unusual among the plank shields in being roughly circular (120 by 145 mm) and is slightly eccentric with respect to the grip, allowing more room for the knuckles above the horizontal handle. The aperture was cut after the board was assembled, as on shields **616–618**. The board is 8 mm thick at the centre, thinning to 6 mm close to the edge, and then tapering rapidly to 3–4 mm at the edge itself. The board was convex, and probably stood about 100 mm high at the centre when laid on a flat surface.

The board had also had its reinforcing bar added, but later removed before burial. The line of nail holes for attaching it is clearly visible across the middle. Three nail holes, out of a probable four, survive on the intact side.

This shield had had its boss attached at some stage. The nail holes are visible, and are not orientated as a '+' but as a '×', which is the orientation required by boss **590** and others. There actually seem to be two distinct sets of holes, indicating that two different bosses were fixed at different times.

The stitching holes around the edge are 6–9 mm apart, and 8–10 mm from the edge of the board.

Contrary to the published report, the shield had been painted. The remains of a coat of gesso and traces of a brick red pigment are to be seen. The shield was painted after the edging was sewn on, as the area covered by the binding had clearly never had gesso or pigment on its surface.

620

Oval wooden plank shield (shield V)

Provenance: embankment at L7–W5
Location unknown
Dura no. unknown
Height 1.15 m,* width 0.95 m,* thickness 4–9 mm
* Restored figures from site card.

This oval shield of poplar planks was cursorily published with **616** to **619** in *Rep.* VII/VIII, (327, fig. 84). It was not found in the Yale collection. However, it is probably significant that the Yale record card contains neither a Yale accession number nor a photograph, but only a Dura site card. It cannot be identified with any of the available pieces as details, such as season of discovery, do not tally.

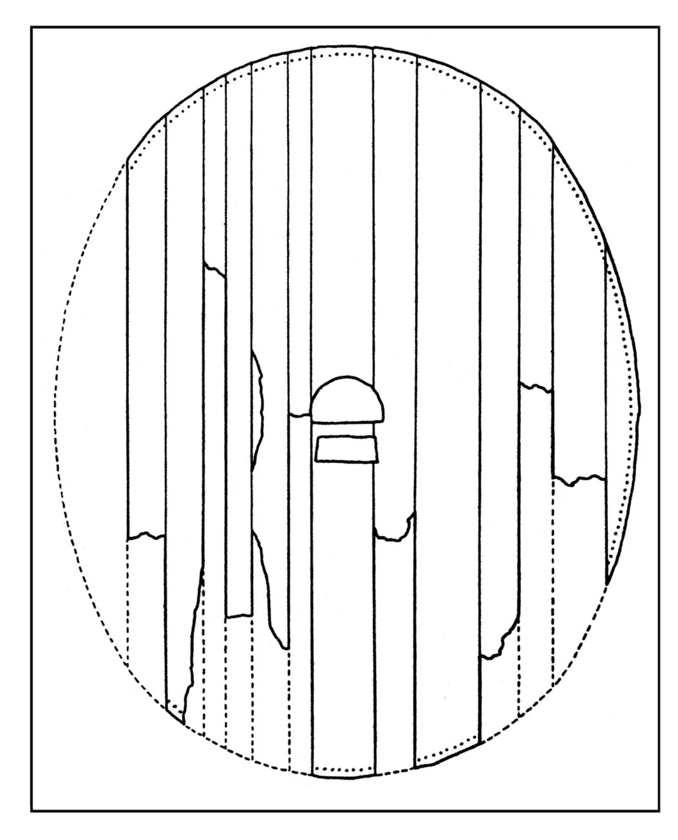


Figure 100 Shield-board **620**.

The shield was in pieces when found, and substantial portions of its lower half were missing. It bore traces of pink paint. The planks were 40 to 100 mm wide. Stitching holes survived around the edge.

621

Fragment of oval wooden plank shield (Cumont fragment A) (not illustrated)

Provenance: Tower of the Archers (Tower 2)
Location unknown
Surviving portion 520 mm by 320 mm

Published but not illustrated in Cumont 1926, 262 (translated below):

> Part (52 x 32 cm) of an oval shield, made of small planks perfectly joined and well smoothed, 5 to 7 mm thick, covered by a sort of parchment completely adhering to the wood; this close contact was obtained by the use of a very strong glue, with the interposition of vegetable fibres [*sic*] between leather and wood, and finally by the use of iron nails, which transfixed the defence and which were provided with metal roundels on each face, to hold it all together. The wood was in a perfect state of preservation.
>
> The two faces are painted. One is basically dark green. One can distinguish the remains of a border, some traces of blue and three or four yellow spots, like the small ovals which we find on the other side; these here allow us to distinguish a little more of the detail. A border of scarlet, more than 20 cm wide, and bounded on the inside by a narrow white band, and then another wider band of green, then a new white area after which all the rest seems to be dull green. Parallel to the white line there are near-circular motifs, with white or yellow outlines and rays, followed by a band covered with small lilac ovals, very close together each with a small white spot. All of this gives the impression of a garment of which the white line is the hem, the small ovals represent the gems and the circular ornaments the larger jewels. All the colours are remarkably strong and resistant to washing [! *sic*].

The lack of any illustration is a serious handicap to understanding the object. However, it is at least clear that the shield was of the standard plank construction, with the layers of fibre and glue and skin facing seen on a number of other fragments now at Yale. The iron nails with metal roundels are probably the attachments for an iron reinforcing bar.



Figure 101 Fragmentary shield-board **624**, detail of toolmarks.

622

Fragment of an oval wooden plank shield (Cumont fragment C) (not illustrated)

Provenance: Tower of the Archers
Location unknown
Surviving portion 1.02 x 0.32 m

Published but not illustrated in Cumont (1926, 262), translated here:

> Shield of oval form, with a parchment-like skin [facing] and a . . . rigid framework. The surviving fragment measures 1.02 m by 32 cm . . . The complete shield would have been about 1.1 m to 1.2 m on the longest axis by 80 cm in width.
>
> The board is made of small planks 5 to 6 mm thick, well smoothed and arranged edge to edge in perfect fashion. The glue is sprinkled with shredded fibre [?]; strong parchment was glued on one of the faces. It adhered only around the middle. The surrounding parts had shrivelled up.
>
> The base paint was green, and in the centre one sees a large area of pink, with some traces of brown, with traces of blue around the edge [?]. All the circumference of the shield was decorated with a red border, bounded towards the centre by two white lines.
>
> Various traces show that the reverse had also been covered with skin.

Again the absence of photographs or drawings is a serious hindrance, but the reconstructed size is obviously very similar to the more complete examples found during the later Franco-American campaigns. The plank construction, fibre, glue, skin covering and bright painting are all typical of Durene shields.

623

Fragments of an oval wooden plank shield (Cumont fragment D) (not illustrated)

Provenance: Tower of the Archers
Location unknown
Dimensions unknown

Published but not illustrated in Cumont 1926, 263, translated here:

> ‘A dozen pieces seem to be the fragments of another oval shield, on which the painting was not applied to a skin [covering] but directly onto the wood. The little plank [*sic*] is covered in a thin layer of plaster, mixed with very fine vegetable fibres [*sic*], onto which the colours were applied. One sees pink overall, but one cannot distinguish any design. On the back, which is also painted, there only survives a single area, bright brick red in colour.
>
> The wood, which appears to be in good condition, is in some way damaged by age [?] and easily breaks. The paint adheres well, but is raised in scales.’

Clearly fragments of a plank shield with no skin facing, but with the usual fibre glue layer and gesso dressing seen on a number of the other shield-boards.

624

Fragments of an oval wooden plank shield

Provenance unknown
Yale no. 1931.594a–e
Dura no. unknown
Frag. A: 870 mm+ by 63 mm by 7–8 mm; Frag. B: 1035 mm+ by 68–72 mm by 7 mm; Frag. C: 950 mm by 74 mm by 7–8 mm. Frag. D/E not measured.



Figure 102 Shield-board fragment **625**.

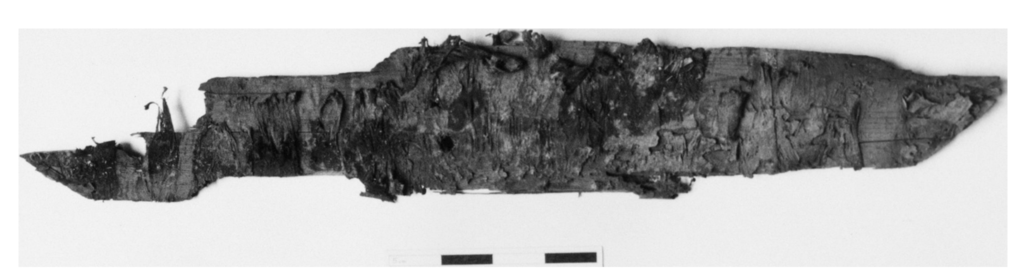


Figure 103 Shield-board fragment **626**, fragment 1108a.

Four thin planks of poplar, one in two joining fragments (D and E). None is complete, but B and C can be restored to their original relationship on the basis of the patterns of insect tracks on their surface which can be matched up. All the timbers show distinct curvature, but it is not clear whether this represents an originally convex shield-board or is due to post-depositional distortion. Timber B shows clear traces of tooling, including chatter marks from a plane or draw-knife and shallow facets from a sharp axe or adze. There are signs of a layer of glue and shredded fibre on both faces of the timbers. Timber D/E has fragments of a parchment-like material adhering to the glue layer, representing a skin facing which originally covered both sides. It is pale pink, with traces of dark red paint on its surface. Part of the curved edge of the shield-board has survived, confirming the original oval shape of the whole shield. Timber A has lost both ends. The original board was at least 1.035 m long, which compares closely to **616–620**.

625

Large fragment of an oval wooden plank shield
Provenance unknown
Yale no. 1938.5999.1110
Dura no. unknown
Length 980 mm+

One side of a shield of plank construction closely similar to **616–620** in form and size. Currently in a box in Yale stores, labelled 'shield fragments, 1930–31 season'. No further details are available.

Large portions of the outer edge survive, with the edge-binding stitching intact, although the material assumed to have been wrapped around the edges (probably skin) is now lost. The stitching holes were 15 mm from the edge, 18–20 mm apart. Two separate threads were used, running between each aperture on opposite faces of the plank.

The face was covered in gesso to provide a suitable unbroken surface for painting, some traces of which remain in the form of areas of pink pigment.

626

Fragments of an oval wooden plank shield
Provenance unknown
Yale nos 1938.5999.1108a–e
Dura no. unknown
Frag. 1938.5999.1108a: 950 mm by 150 mm+ by 3–7 mm thick
Frag. 1938.5999.1108b: 390 mm+ by 85 mm+

A number of fragments of wood, all thought to be from a single shield, found in the same box as **625** labelled 'shield fragments, 1930–31 season'.

Fragment 1108a is particularly large representing one side of an oval shield similar in size and shape to **616–620**. Parts of the curved edges of the shield are to be seen at each end. The wood is split and the knots have fallen out. Both surfaces have a thick layer of glue and shredded fibre laid roughly at right angles to the grain. Both sides also have remains of a layer of thin skin or parchment, on one side stained pink with traces of dark red paint. The timber is somewhat charred. Along the edges stitching holes survive, 10 mm from the edge and 18–20 mm apart. Fragments of the twine are still in place. On what had been the transverse axis of the oval shield, 10 mm in from the surviving inner edge of the timber, an iron nail is still *in situ*. It has a flat rectangular head, 7 by 10 mm, and the shank projects 15 mm out of the opposite side of the plank. It is bent over at 45 degrees at 10 mm above the surface. This nail is interpreted as a fastening for a transverse iron reinforcement/grip bar.

Fragment 1108b has no preserved edges, but does contain one side of the central grip aperture. It has the same fibrous glue and painted skin facing as fragment 1108a. This is again pink-stained on the outside, while the inside appears to have been painted some very dark colour, probably black. There is no sign of gesso, not surprisingly given the presence of a skin facing which renders it largely superfluous. The wood is slightly charred. A small fragment of wood found with it is probably part of the integral wooden grip. It too is charred.

Fragment 1108c has the same facing treatment on both sides. It consists of two timbers, one of which retains its full width, in this case 80 mm. The fragment comprises one side of a shield-board. Part of the edge survives, enough to show that the shield was similar in size and shape to **616–620**. Stitching holes survive around the rim, roughly 15 mm from the edge and about 20 mm apart.

Two other fragments found in the same box and now labelled 1108d and 1108e are fairly certainly from the same shield, as they have the same characteristics of surface covering etc. The skin on one side of fragment 1108d is painted black.



Figure 104 Shield-board fragment **627**.

627

Fragments of an oval wooden plank shield
Provenance unknown
Yale nos 1938.5999.1105a–c
Dura no. unknown

Three fragments of one side of an oval plank shield similar in size and shape to **616–620**. Two (a and b) represent a single plank, split along the grain. It was at least 105 mm wide and up to 6 mm thick, thinning to 5 mm towards the edge of the shield. The surface was roughly finished. There are no traces of edge stitching. The other timber (c) preserves the long sweeping curve of the side of the shield, again lacking stitching holes. It retains an iron nail 25 mm from the edge which is interpreted as a fastening point for an iron reinforcing bar/grip running across the short axis of the shield. There is no sign of any layer of fibre and glue on either face of the wood, but traces of gesso are visible. A layer of fine cloth seems to have been pressed into this, and pinkish paint applied over it. Alternatively, the fabric may have been glued on and then gessoed, with some of the plaster-like material working



Figure 105 Shield-board fragment **628**.

its way through the fibres to adhere to the wood.

628
Fragment of an oval wooden plank shield
Provenance unknown
Yale no. 1938.5999.1106
Dura no. unknown
Dimensions: 375 mm+ by 80 mm by 3–5 mm

Part of an 80 mm wide plank from an oval shield, charred at the broken end. The intact end retains the edge curvature typical of shields of the size and shape of **616–620**, and possesses vacant stitching holes, only 4 mm from the edge and 12 mm apart. The corner of the plank has been neatly sawn off at some stage, probably in modern times for a wood sample, although no record of this was found. There is no sign of a fibrous glue layer or skin covering, but traces of gesso are clearly visible. Fragments of fine cloth also adhere to the surface, and as on **627** appear to be part of the original structure of the shield. These are overlain by more gesso and then paint. The colours appear to be red near the rim and black towards the middle of the shield, but this could be due to fire blackening.

629
Semicylindrical plywood shield (Plate 10; Figs 106 and 107)
Provenance: Tower 19
Yale no. 1933.715
Dura no. 'F1041–1042 probably'
Height 1.06 m, width around curve 0.86 m, chord 0.66 m, thickness 5–6 mm
This is one of the most famous finds from Dura, published in some detail in *Rep.* VI, 456–66, frontispiece, pls XXV–XXVI.

There is nothing to add to the detailed description of the painted decoration to be found in the report, but there are a number of amendments to be made to the description of the structure of the shield, as a result of inspection of the original at Yale, as well as on the basis of the Dura site records and unpublished photographs of the shield as found.

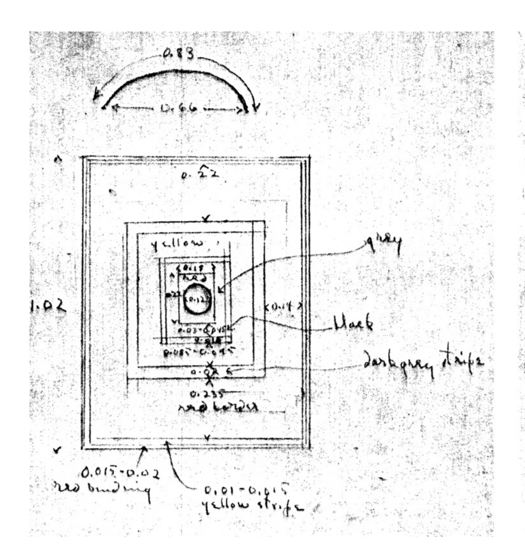
The shield was in thirteen pieces when found, and it is evident from the current appearance of the board that the heavy repair work required by the many breaks was carried out with the primary objective of restoring the painted decoration, and that the actual structure of the board was partially sacrificed to that end. The result was fairly drastic. For example there is now no trace of the system of wooden reinforcing strips on the back of the board mentioned in the *Report* and sketched on the Dura record cards (Fig. 107; *Rep.* VI, 457; see **631**). The whole of the rear face of the board is covered in modern conservation materials. The hand grip may not be original. It is now held in place by modern nails.

Crucially, the current appearance of the board does not reflect the original curvature of the shield, which both site records and photographs agree was much more gentle than that seen today. The 660 mm chord width recorded on site has been reduced





Figure 106 Shield-board **629**, in fragments, as found.



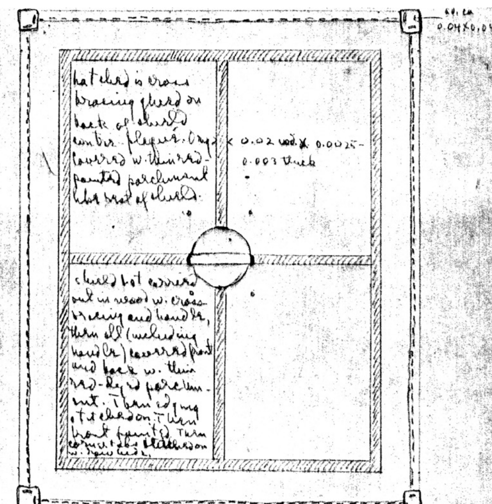


Figure 107 Site sketches of shield-board **629**, showing original measurements, estimates of shape, and colour notes (left), and the now lost system of reinforcing strips on the rear face (right).

to 480 mm at the bottom and only 400 mm at the top, a severe distortion.

The dimensions of the board are not quite as given in the *Report*. It is not a perfect rectangle, being 1.02 m high on the (bearer's) right side, 1.01 m on the left, and 1.06 m down the centre.

It was made of thin strips of plane wood (*Platanus orientalis*: *Rep.* VI, 456, n. 59) between 30 mm and 80 mm wide and 1.5 mm to 2 mm thick. These were glued together in three layers, forming a plywood board. The strips in the core layer were arranged vertically, those in the inner and outer facing layers running horizontally across the shield. The central aperture, *c.*120 mm in diameter, must have been cut after the board was assembled.

Although no trace of the system of 'reinforcing strips' has survived restoration, a detailed sketch of their positions exists in the Dura archive (Fig. 107). They were very light, being only about 20 by 2.5–3 mm in section.

The central grip simply consisted of the thickening of the central portion of one of the reinforcing strips at the point where it crossed the central aperture. This thickening apparently projected towards the bearer, rather than towards the boss as seems to be the case on most of the other shields from Dura. The heavy rawhide lashings which are recorded as reinforcing the grip on each side are now missing (*Rep.* VI, 457).

There is some confusion and error in the publication with regard to the method of facing the board. According to the published account, both faces were covered with red-dyed skin or parchment (*Rep.* VI, 457). The site record cards state that this also covered the grip. Then a layer of fine fabric was glued over the front face, onto which the paint was applied. My own inspection disagrees with this. The paint is quite clearly applied directly to the skin, and there is hardly any sign of a layer of fabric, except at one point where a few square centimetres are visible. However, due to the restoration work carried out since discovery the relationship of this to the skin is obscure. A careful reading of the site cards makes it clear that when the fragments of the board were found, the fabric was seen to be under the skin, not over it. The explanation may be that the published account was made from the site cards without reference to the object itself, which allowed this critical error to creep in as the result of a misreading. The wording of the card is hard to read, but is as follows: 'Fine linen cloth stretched across. Red dyed parchment front covering first. [illegible word] underpainted red. Then three broad color areas painted across that.' It would appear that the word 'first' was interpreted to refer to the order in which skin and cloth were applied, while the context makes it clear that it actually refers to the red undercoat paint.

There is also confusion about the covering of the back of the board. This was also supposed to have been covered in red-dyed skin which overlay the reinforcing strips as well (record cards and *Rep.* VI, 457). Puzzlingly, there is a typed report in the Dura archive by du Mesnil, entitled 'Note sur la face interne du *scutum* de la tour 19', which records that the parchment was in tatters when found and describes its colour as off-white to buff or yellow. There is no mention of red dye. A sample was analysed at the Musée d'Histoire Naturelle in Paris, where Prof. M.E. Bourdelle identified it as sheepskin. It is hard to explain the apparent contradiction. I can only suggest that the skin was indeed basically whitish, but that this had become slightly stained on the surface to a pale pink as a result of an overlying coat of red paint such as that seen on the front. Such staining is seen on some of the other skin-faced shields.

None of the rivet holes for the boss survive today, though one, with part of an iron rivet still *in situ*, is mentioned in the publication (*Rep.* VI, 457) and is visible in a photograph (archive photograph Y155). Four rivet holes are drawn in on the site card sketch of the rear of the board.

The decorative scheme on the front of the shield was described and discussed in detail in *Rep.* VI, 457–66. Like **616** and **617**, this consists of decorative bands around the boss position (in this case filling most of the field), and a painted border. In the upper part of the shield is an eagle, wings outstretched and with a laurel wreath in its beak. It is being crowned with more wreaths by winged victories, one on each side. The lower part is occupied by a male lion, seen in profile but head turned to face the viewer. It is flanked by large star motifs.

No other examples of the classic semicylindrical shield are yet known outside Dura, but earlier versions of different form do seem to be represented. The Fayum shield (Kimmig 1940) is probably a late republican long *scutum*, with a spine and somewhat rounded ends. Two first century AD shield covers from Vindonissa, identified by Gansser-Burckhardt as being from *scuta*, also have rounded ends (1942, 74–9, nos LV, LVIII, figs 49–53).

630

Leather facing and wood from a semicylindrical shield (Cumont fragment B) (not illustrated)

Provenance: Tower of the Archers (Tower 2)
Location unknown
Dimensions 930 by 620 mm*
* These dimensions are not likely to represent the original size of the board, as the facing has shrivelled up. The complete shield was presumably somewhat larger.

Published by Cumont (1926, 262) but not illustrated. The description is translated here:

> Rectangular skin [facing] (93 x 62 cm), the edges of which are shrivelled up towards the centre which remains glued to small juxtaposed strips [*plaquettes*] of wood. The leather is thick, softer and less like parchment than fragment A [**621**]; the wood is only 2–3 mm thick and is not perfectly smoothed. The presence of glue on both faces indicates that there had been two layers of strips arranged perpendicularly, one on top of the other. The adherence of the leather was obtained by a colloidal coating which was mixed with ligneous fibres.
>
> The painting was very badly deteriorated, one only sees a vague staining, of yellow and green. Only the oval hole (13 x 10 cm), pierced through the leather and wood, is edged in dark red.

This quite clearly describes the remains of another semicylindrical shield of plywood. It is essentially similar in structure to **629**, but may have been slightly thicker, as




Figure 108 Shield-board fragment **631**, outer face (left) and inner face.

one layer of strips was 2–3 mm thick, compared with 1.5–2 mm on **629**.

631

Fragments of a plywood semicylindrical shield

Provenance unknown
Yale no. 1938.5999.1109
Dura no. unknown
Dimensions of the intact corner: height 485 mm+, width 240 mm+, thickness 7 mm

In the box of fragments from the 1930–1 season containing **625** and **626** was one complete corner and several loose strips from another *scutum*, hitherto unpublished.

The corner, which still retains the curvature which shows it to be part of a semicylindrical *scutum*, is either the top right or the bottom left corner of the board (as seen by the bearer). It is made of three layers of wood, the outer two arranged horizontally, the core layer vertically. The whole is 7 mm thick. The strips of the inner face layer are 80–90 mm wide and only 2 mm thick. One of the two surviving strips in the core layer is 60 mm wide, the other 90 mm. They are 3 mm thick. The strips of the outer facing layer are, from the corner inwards, 110, 100, 150 and 90 mm wide, and 2 mm or even 1 mm thick. Consequently, the sum of the thicknesses of the two facing layers is roughly equal to that of the core layer. The edges of the composite board are carefully chamfered on both sides. Traces of a layer of fibre in glue are to be seen on both surfaces. The fibre is roughly laid at right angles to the underlying strips. It is overlain by gesso and paint. There was no skin facing.

On the back are the remains of a system of 'reinforcing strips' of wood, like those on **629**. These are quite crude and very light, only 10–20 mm wide and 2–3 mm thick, 60 mm in from the edges. They seem to overlie the fibre and glue and perhaps the gesso, but underlie the paint. However, the gesso may well have seeped under them, as it penetrated the structure of the ply. These strips are held in place by small wooden pegs or dowels, 3 mm thick, spaced 90 mm apart. These pass through the ply. Their function is unclear. They are too flimsy to act as reinforcements, and are attached firmly enough for them to prevent the ply springing apart – a function performed much better by the edge stitching.

The paint seems to have been applied directly onto the gesso on both sides. The design is obliterated, but the base colour appears to have been dark red, while towards the centre of the board are traces of a darker area (black?) defined by a straight white line, perhaps indicating a wide decorative border around the rectangular boss, as seen on the complete semicylindrical shield-board (**629**).

The loose strips add little to the picture, except to show that the exposed faces of the outer layers were carefully smoothed, while the inner sides were left rough, as one might expect, to aid adhesion between the glued layers. The strips vary between 50 and 150 mm wide, and 1.5–3 mm thick. Some surfaces bear chatter marks or saw scars.

632

Fragment of a plywood shield (not illustrated)

Provenance: 'L7-by Tower 19'
Location unknown
Dura no. F561
Dimensions unknown*
* Judging from the scale on the photograph the fragment seems to be about 120 mm square.

Known only from a site card preserved at Yale and a photograph (G766), this fragment of a shield of plywood construction is broadly similar to **629–631** and may represent a fourth semicylindrical shield-board, though no edges were preserved to indicate its shape. The description on the card states: 'Fragment of laminated wood buckler. 3 ply in frag.[ments] Fragg.[ments] of painted leather covering adhering to surface – seems all dark red.'

633

Oval plywood shield with no boss

Provenance: embankment in N8–W1
Location unknown
Dura no. unknown
Dimensions unknown

A brief mention of this shield appears with the description of the painted oval shields (*Rep.* VII/VIII, 328, n. 1):

> A large fragment of a sixth shield was found in the embankment in N8 W1. It differed from the others in being made of the same sort of plywood as the Roman *scutum* [**629**] and was apparently covered with cloth or parchment. About one fourth of its oval surface was preserved with holes along the rim for lacing on a leather edging. The surface gave

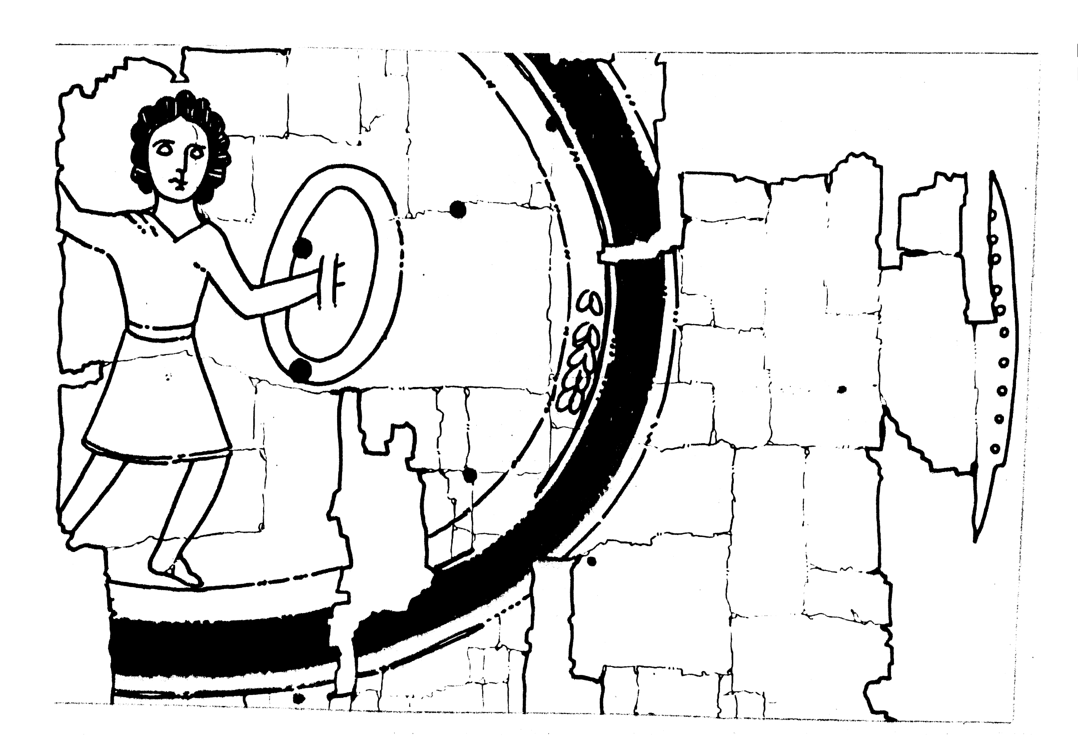


Figure 109 Shield-board **633**: Pearson's sketch preserved at Yale.

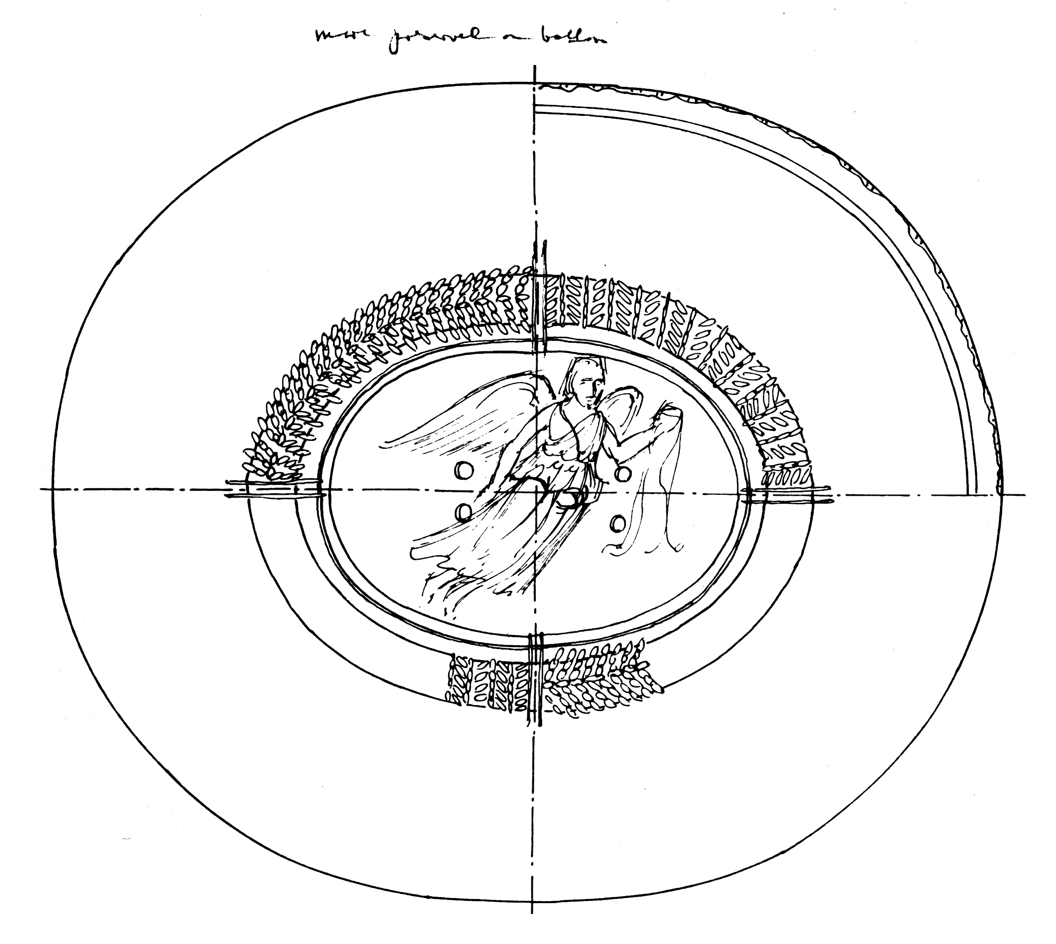


Figure 110 Shield-board **634**.

evidence of an overall undercoat of deep pink with traces of figured decoration too fragmentary to be satisfactorily restored. Parts of a heavy leaf border and what seems to be a male figure have been recognized.

The object was not illustrated, but in the Yale catalogue is a card which contains a drawing of the shield by Pearson. The drawing is truncated at top and bottom, but bears a note 'more preserved at bottom'. The card also mentions a 'MS description by Pearson' which was not found. No photograph of the object is known, and there is no record of a Yale accession number, so it seems unlikely that it reached America.

The details we have are very meagre. It is not even known how large the shield was. However, the drawing does allow some general comments to be made. Particularly noteworthy is the orientation of the figure, which shows that the long axis of the oval shield was horizontal, contrasting with **616–620**. There was also no central aperture for the grip. The black spots on the drawing probably represent an arrangement of holes like those seen on **634**, probably for the attachment of a single grip behind the board, although some other arrangement such as a forearm strap cannot be entirely ruled out.

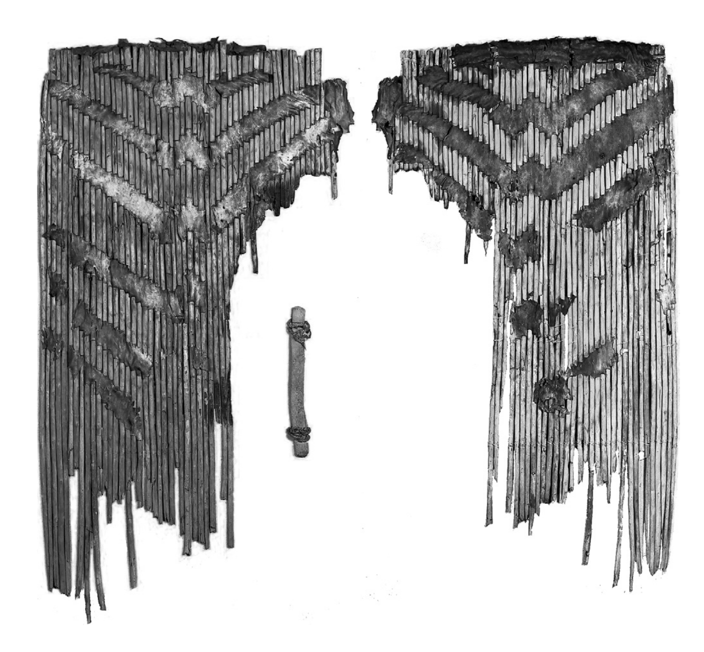


Figure 111 Wood and rawhide shield, **635**.

The shield's ply construction, leather facing and edge stitching show that it is related to the other Roman shields from Dura, and this is confirmed by the painting. This has much in common with the other painted shields. A broad band of concentric rings of laurel leaves, etc., surrounds the central space but leaves a wide outer border, which may have contained other decoration that was lost by the time of discovery. In place of a boss the central space encloses a single male figure, perhaps a deity, moving right with an oval shield in his left hand and his right arm raised probably holding a spear or sword now lost. The face is shown in strict frontality, and is surrounded by thick curly hair. The obvious parallel is the 'Warrior God' shield (**618**). It is noteworthy that the figure is closer to the local artistic tradition than the more classical presentations of **616** and **617**.

634
Oval shield-board or covering with no boss
Provenance unknown
Location unknown
Dura no. unknown
Dimensions unknown

This object is known only from an unlabeled drawing found in the Yale records by Mr M. Lindsay. It is a detailed sketch of another shield of the same type as **633**, but apparently complete, or substantially preserved. There are no markings or captions to suggest where it was found, what it was made of, or any other data.

It was an oval, with its long axis horizontal, and lacked a central aperture. There were stitching holes around the edge. It is not known if this was just a loose leather facing, or whether it was still fixed to its board. The drawing suggests that there were four holes around the centre, corresponding with those seen near the middle of **633**. These were probably designed to hold a single horizontal grip behind the board.

The decoration was broadly similar to that of **633**, with the broad band of foliage around the centre seen on shields **616**, **617** and **629**, with a single figure in the central space. This is a victory, flying to the right, clutching a victor's crown in her left hand. Similar victories appear on **629**. The only decoration outside the broad leafy border seems to be a narrow line of paint close to, and parallel with, the edge. There are no details of the colouring.

635
Wood and rawhide shield
Provenance: Palmyrene Gate
Yale no. 1929.417
Dura no. unknown
Length 1.55 m+, width 0.78 m
Published in *Rep.* I, 16, fig. 4, and *Rep.* II, 74, pl. XXVI, where it is fully described

This and the similar shields **636**–**638** consist of vertical wooden sticks woven through patterns of slits in a large sheet of rawhide which, on drying, contracted and held them tightly in place. Where they are complete enough to see, these shields are square at one end and pointed at the other, but it is not known which end was the top. It was published with the flat end upwards, but this is probably erroneous (see parallels below).



Figure 112 Wood and rawhide shield, **636**.

Only about half the shield is preserved. It is basically rectangular, but the destroyed end was almost certainly pointed like **636** and **637**, as the few rods which are preserved to their full length are cut obliquely. The shield would therefore have been as tall as a man, and although undoubtedly light was cumbersome.

The wooden sticks were up to 15 mm thick, and were woven through slits cut in a carefully thought out pattern in a single sheet of rawhide. The skin was turned over the tips of the sticks at the straight end, and held by a thong laced between the rods. This was not to prevent the rods sliding out of the rawhide (something they could not do once the skin had dried out and contracted around them) but was partly to protect the ends of the sticks from damage and mainly to hold at least one transverse stick across the top of the shield. This made the defence rigid, and stopped it curling up as **636** has done. The sides were secured in a similar way, the skin being wrapped over the end stick and sewn through.

The pattern of holes in the rawhide was such that once the sticks were woven in, a surface pattern of alternate bands of skin

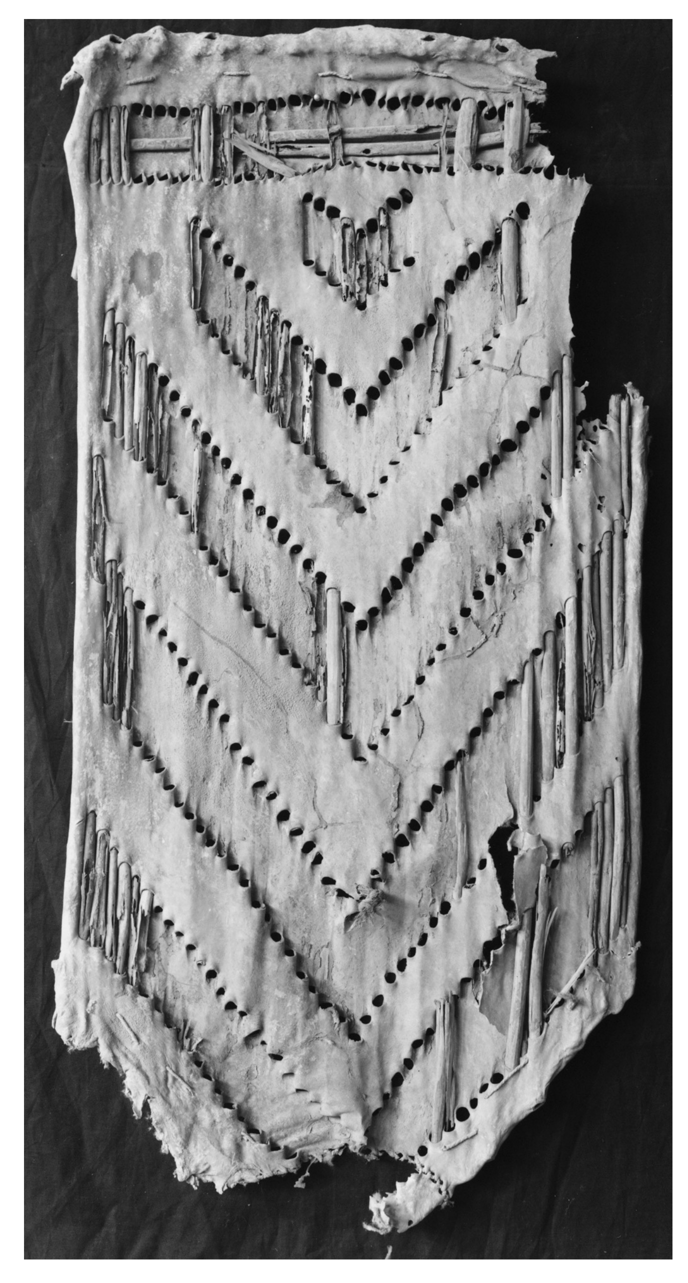


Figure 113 Wood and rawhide shield, **637**.

and wood resulted. In this case, a series of wide and flaring 'W's runs down the front and back faces. Fifty-four whole or fragmentary rods survive, and this is probably close to the original number.

A 'grip' was found with the shield, but was not attached. It is a slightly rounded piece of wood, 400 mm long and 30 mm thick, with grooves at either end to accommodate knotted cords, presumably for fastening it to the shield. These survive *in situ*. It is not known where the grip was fixed to the defence.

It has been suggested that this was a protection against arrows, and was not strong enough for hand-to-hand fighting (*Rep.* II, 75).

There are structural parallels from the Altai, where small shields made in the same manner have been recovered from tombs of the fifth century BC (British Museum 1978, 47, no. 30; Rudenko 1953, pl. LXXXVII; Rudenko 1960, pl. LXI). Assyrian shields, which seem to have been made in the same way, were flat at the *bottom* (reliefs from the South-West Palace, Nineveh, British Museum room xxxiii, panels 1–3).

636

Wood and rawhide shield

Provenance: 'near Tower 19'*
Yale no. 1933.470
Dura no. F1040
Overall length 1.02 m, length of straight edges 0.76 m, width 0.51 m+
* From a site card preserved at Yale.

Not formally published, but it appears in a photograph in Hopkins (1979, 191) where it is apparently confused with **635**. The structure is essentially identical to that of **635**. It is made from fifty-one vertical rods, and originally had two horizontal ones across the top to keep it flat. These were both broken in antiquity and so the shield has curled up. The sticks had been roughly stripped of bark, and are lightly faceted from the knife that whittled them to shape. The resulting surface pattern in the rawhide consists of a series of inverted chevrons. The edges were secured in much the same manner as those of **635**. At the top, a 50 mm wide flap of skin was folded over to hold the stiffening rods and was secured by 3 mm thick twine sewn through between the vertical rods. The same technique was used along the diagonal edges.

On the left side, a loop of twine is tied around the seventh, eighth and ninth canes from the edge, about half way up, probably as an attachment for a grip.

637

Wood and rawhide shield

Provenance: L7–8W
National Museum, Damascus
Dura no. unknown
Overall length 1.01 m, width 0.48 m

Recorded in the Yale catalogue as being in Damascus. However, the description on the original site card was available, along with a photograph (Damascus photograph N122). It was found in 1932–3, i.e. the sixth season. Most of the sticks were missing from this example when found, as the result of insect action. Almost identical in size and construction to **636**, it consisted of forty-two rods, making a chevron pattern in the single sheet of rawhide. It had the same pair of transverse stiffening rods across the top, which were secured in the same way as those of **636**, as were the lower edges. The edge rods were extra-thick, 10 mm instead of the 5–9 mm of the others. The sides of the skin were folded over and retained rows of holes which the excavators thought were for a system of thongs or cords criss-crossing the shield. Similar lace-holes are to be seen on the upper and lower edges, in addition to the twine sewing.

The site card, preserved at Yale, identifies the hide as sheep, but this must be treated with caution. There is no trace of the handle.

638

Fragments of a wood and rawhide shield (not illustrated)

Provenance unknown
Yale no. 1931.595 a–f
Dura no. unknown

A number of loose fragments of rawhide from a shield of the same construction as that of **635–637**. The wood has probably been eaten away by insect action, as on **637**.

Shafted weapons

Evidence and interpretation

There is remarkably little evidence for hand-held or hand-thrown shafted weapons (e.g. spears, lances and javelins) in the city. There is a single definite spearhead (**639**) and a handful of sockets (**640–642**), one possible special siege weapon (**643**) and two objects which are either spiked ferrules or simple bodkin points (**644–645**). In addition, a possible broken spearshaft was recorded at the site (**646**) but apparently not preserved. A mace-head (**647**), which may be loosely defined as from a kind of shafted weapon, completes the meagre group.

This state of affairs is unfortunate, as it appears that the third century was a period of considerable innovation and change in this area (Bishop and Coulston 1993, 123). The traditional legionary *pilum* underwent substantial change and other weapons were substituted for it (objects identified as *pilum* heads with small lengths of shank attached are often misidentified tanged bolt-heads, e.g. Bishop and Coulston 1993, fig. 83:2 and 5). Soldiers are sometimes depicted holding two spears, probably throwing weapons. A variety of new weapons make their appearance by the end of the third century. Perhaps the best known is the *plumbata* or *martiobarbulus*, a small barbed and fletched dart widely used in the fourth century, but apparently developed during the Tetrarchy if not before (Vegetius 17.3.14). Many have been found, for instance at Wroxeter (Musty and Barker 1974), although none, as yet, at sites as early as Dura. Another type which appeared earlier is the light javelin carried several at a time by the *lanciarii*, specialist legionary javelin men who may now be traced to an origin in the early third century with the discovery of the tomb of a trainee *lanciarius* of *legio II Parthica* at Apamea (Fig. 25:F; Balty 1988, 99, 101). No trace of such arms was found at Dura, nor were there any recognizable remains from the *contus* or heavy cavalry lance, although these were surely in use (Bishop and Coulston 1993, 109). Such weapons were employed by Partho-Sasanian heavy cavalry and are depicted in use, held with both hands, in the Synagogue paintings (Plate 4). They were used by Roman cavalry regiments from the second century and occasionally appear on tombstones' such as that of Adiutor from Tipasa in Mauretania and another from Gerulata in Pannonia (Speidel 1987, figs 3–4).

Other shafted weapons shown on tombstones, with multiple weights or possibly ribbons, and complex bindings or carving, may have been display items or some kind of symbol of status or office, like the spear of the *beneficiarius* (Fig. 25:E). Carved third-century spearshafts are known from Danish bogs (Bishop and Coulston 1993, 126).

The similarity of ferrule **644** in form to socketed bodkin bolt-heads, and the overlapping of socket diameters with the size of catapult ammunition, makes it possible that some of the pieces identified as bolt-heads are in fact ferrules. Particularly likely candidates are bolts **764** and **776** to **781**. The round-sectioned examples **779–781** could well be ferrules, by comparison with copper alloy examples from Europe which cannot really be anything else (a particularly fine Greek example is displayed in the British Museum: GR 1919.7–14.1). It may be that the heavy, diamond sectioned projectile points here described as bolt-heads **795–803** are in fact ferrules, or more probably javelin-heads, although their relative bluntness suggests that their present identification is the most likely.

Whatever the case with the bodkins, the general absence of larger spearheads is surprising. It seems highly likely that such weapons were used in large numbers by both sides. The best explanation for their virtual absence from the surviving assemblage is that they were not present where the best deposits were laid down, i.e. in the rooms of Tower 19 and the cramped mine beneath it, although according to du Mesnil two 'têtes des javelots en fer' were found on the floor of the countermine (1944, 23, fig. 9:D). It would be most interesting to know the form of these pieces, which cannot now be identified. Perhaps they were some kind of special, short-shafted weapon for mine fighting, where wielding long slashing swords was not very practicable.

Most of the presumably abundant spearheads were probably looted, or lost to corrosion (most of the swords are represented only by relatively resistant copper alloy fittings).

Perhaps the most interesting item in this meagre group is **643**. The projecting side bar could, however, simply be a tread for pushing it into the ground, in which case it may be the base of a standard. Such winged ground spikes are seen on a number of tombstones, such as that of Aurelius Diogenes from Chester (Anderson 1984, pl. 6), or the fourth-century monument to Lepontius at Strasbourg (Espérendieu 1918, no. 5496). However, it could be some kind of special weapon, perhaps a boat-hook-like device for toppling siege ladders, pulling down burning materials, hooking away protective coverings from siege machines, etc. – similar to the *falx muralis* which Josephus describes in the context of the siege of Jotapata (*BJ* 3.20). Gamla has produced a weapon with a leaf-blade and a 'reaping-hook' which seems to be an example of this kind of weapon (G. Stiebel, pers. comm.). Given the provenance of **643** at the siege ramp, such an interpretation is attractive.

The mace-head **647** is also an important find, since it is a category of weapon mentioned by Arrian as carried by cavalrymen (*Ars tactica*, 4.9), but is rarely identified archaeologically.

Catalogue: Shafted weapons

639

Broken iron spearhead
Provenance unknown
Yale no. 1938.5999.1084
Dura no. unknown
Length 113 mm+

A spearhead of diamond-shaped section, with poorly defined shoulders and slightly converging edges. It is heavily corroded. The socket appears to be closed, and has a maximum internal diameter of *c*.18 mm. No fastening nail is identifiable in the profuse corrosion products.

The blade is too fragmentary to identify the exact form, but it is closely similar to a first-century example from Hod Hill (Scott 1980, 333, fig. 24.1.3).

640

Iron spearhead socket
Provenance unknown
Yale no. 1938.5999.1082
Dura no. unknown
Length 82 mm+

A broken socket, with a maximum internal diameter of 23 mm. It is probably from a spearhead, but could be from a ferrule like **643**. The metal is overlapped, but not forged together, forming a split socket. The hole for the fastening rivet is empty.

641

Iron spear/javelin-head socket
Provenance unknown
Yale no. 1938.5999.1085
Dura no. unknown
Length 52 mm+

An open-sided socket, maximum internal diameter 14 mm, which may never have been closed round a shaft, or conversely may have been forced open. In either case, it is possible that the apparent socket diameter is misleadingly large. Probably from a javelin-head, although the possibility that it was from a ferrule/ground spike like **644** cannot be dismissed.

642

Iron spear/javelin-head socket
Provenance unknown
Yale no. 1938.5999.1083
Dura no. unknown
Length 77 mm+

A socket of *c*.13 mm maximum internal diameter. Although now extremely corroded and heavily fissured, this object appears to have been a fully closed socket. The fastening nail was not identified. Part of the grain of the wooden shaft is preserved by the corrosion products inside. The small diameter suggests a javelin.

643

Iron *falx muralis* (?)
Provenance: J8 Ramp
Yale no. 1938.5999.1124
Dura no. I217
Length 249 mm

The socket accommodated a relatively broad shaft of up to 26 mm diameter. The object terminates in an elongated spike

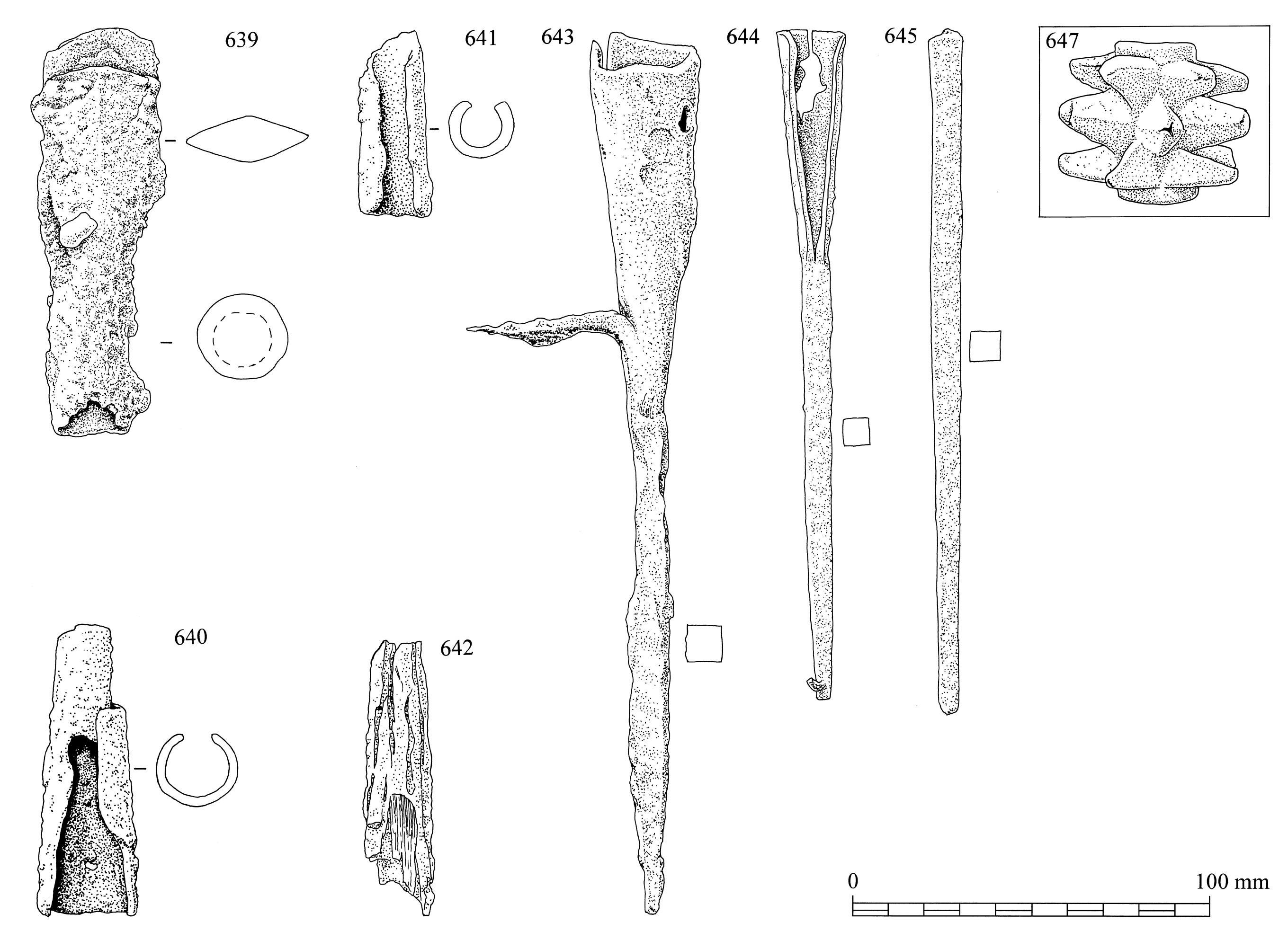


Figure 114 Shafted weapons: iron heads and butt-spikes from spears, **639** to **645**, and copper alloy macehead **647**.

of square section. At the base of this is fixed a projection, perhaps incomplete, which runs out at right angles to the shaft.

Probably an implement or weapon like the *falx muralis*, specially designed for use in siege warfare. An alternative and less likely interpretation of this is as a ground spike, for something like a standard, with a 'step' for pushing it into and pulling it out of the earth.

There is a fairly close parallel to this curious piece from the Saalburg (Jacobi 1897, fig. 77:1). Other parallels, albeit lacking the side projection, are to be found at Corbridge (Scott 1980, fig. 24.4.1), Straubing (Walke 1965, 152, pl. 107:14), and Thamusida in Mauretania (Boube-Piccot 1994, nos 424–5).

644

Iron ferrule/ground spike for a spear
Provenance unknown
Yale no. 1932.1720
Dura no. unknown
Length 188 mm

Internal diameter of the socket is 17 mm. The socket is open down one side and the nail hole torn through.

645

Probable iron ground spike from a spear
Provenance unknown
Yale no. 1929.382
Dura no. unknown
Length 190 mm+

Judging from its shape, it may be a spike snapped from a ferrule such as **644**.

646

Possible wooden spearshaft (not illustrated)
Provenance: J8-W
Location unknown
Dura no. unknown
Length 795 mm+, width 34 mm tapering to 27 mm

Recorded only on a site card in the Yale archives, this object was described as a 'Frag.[ment of] round wooden shaft, painted red. Light, close-grained wood. Where paint has disappeared covered w.[ith] what seems to be a pale blue [?]-gray size. Part of lance or javelin-shaft?'

647

Copper alloy head of a cavalry mace
Provenance: L7
National Museum, Damascus no. 10349
Dura no. unknown
Height *c*.65 mm, maximum diameter 82 mm, socket diameter 24 mm

On display in the National Museum, Damascus. Described on a site card at Yale.

The card describes it as: 'Evidently made all in one piece, but has form of three superimposed 5-pointed stars – points alternating . . .
affixed to bronze haft, remains of which remain in hole.' The spikes of the outer rings are triangular in section, those of the central ring are rhomboidal.

Clearly a mace-head, and identifiable as a specifically Roman cavalry weapon mentioned by Arrian, who records that, in addition to lances and swords, Roman cavalrymen 'also carry small axes [*sic*] with spikes in a circle all around' (*Ars tactica*, 4.9, translated by F. Brudenall).

Other examples are known from Mauretania (Boube-Piccot 1994, nos 226–30). A closely similar object, said to be from Iran, is in the Louvre (AO 20433: de Ridder 1915, no. 1189, pl. 68). There is an elaborately decorated copper alloy example in the Museum of Fine Arts, Boston (Comstock and Vermeule 1971, no. 593).

Bows, arrows and archery tackle

Archaeological evidence for archery is abundant at Dura, although it consists almost entirely of parts of arrows. The bows themselves are represented by just four bone bow laths. There is also a solitary archer's thumb-ring, and what seems to be part of a quiver. For the arrows there are twenty-two fragments of shafts, and nearly seventy arrowheads were found during the excavations, representing around ninety projectiles. None is complete, and no metal head was found attached to a shaft, although some had traces of wood grain preserved in the corrosion products on the tang.

Bows

The handful of bone laths from composite reflex bows (**648**–**651**) are not particularly diagnostic in themselves, inasmuch as these objects are found all over the empire, including Britain (see Coulston 1985, 224–34 for a gazetteer). It is not possible to determine with certainty exactly which form or forms of bow were in use in the Roman empire, as no complete examples survive and depictions are unreliable (Rausing 1967, 65; see Coulston 1985, 234–8 for discussion). Like other composite bows, Roman ones were basically of wood, with horn on the inside (belly) to resist compression, and a layer of tendon in glue on the outside (back) of the bow to resist tension. Strong bone nock-plates, or laths, formed the tips. (For the details of construction of this type of bow and its method of operation see especially Coulston 1985, 245–59).

This basic construction is extremely widespread in time and space, from the Mediterranean to Japan, and may be traced back to Neolithic times (Rausing 1967, 146–8). It was in use in Egypt during the Old Kingdom and in Greece by the time of Homer (Rausing 1967, 70, 97). A fragment of Roman date has been found at Belmesa in Egypt (Coulston 1985, 233–4).

Composite bows can be immensely powerful, shooting arrows to prodigious distances. Recorded figures for Turkish bows reach 800 yards (Payne-Gallway 1907, 23). The record set in California in 1953 was 850.67 yards (777.51 m: Rausing 1967, 31).

The best available parallel for the Dura material is the almost complete bow from the cemetery at Baghouz, about thirty miles down the Euphrates from Dura (Fig. 115; Brown 1937; Rausing 1967, 105, fig. 52). Known as the Yrzi bow after the part of the cemetery where it was found, it is dated to the Parthian period (i.e. the first century BC to the third century AD) by associated finds. This unique weapon is preserved at Yale. When found, part of one limb was missing, but the other was intact. As reconstructed, the bow measures 1.275 m across the chord and, like all reflex bows, when unstrung the tips point forwards (Fig. 116:C to E). The wooden core was made in four parts, beautifully scarfed together. The central part is made of oak and elm, the limbs of a third, unidentified wood. This was not for any reason other than local shortage of materials and maximum use of scraps and offcuts. Such a structure offers no mechanical advantages (E. McEwan, pers. comm.).

Traces of the horn on the belly and the tendon on the back survive in places. The four bone laths were still in position at the tips of the stave. The whole was wrapped around with a further layer of shredded tendon in glue to bind the components tightly together. The outer surfaces of the bone laths were roughened to give it purchase, a feature to be seen on one of the Dura laths (**650**). Brown suggested that there had probably been an overall decorative covering to protect the structure, which is very sensitive to damp and insect attack. Such painted coverings are certainly a feature of modern reflex bows from the Middle and Far East.

A replica of the Yrzi bow was made by Mr McEwan, giving an idea of the power and sophistication of the weapons in use in the Dura region in the classical period. It is a powerful weapon with a draw weight of approximately 80 lb (*c*.35 kg), which requires considerable strength to draw fully. For comparison, medieval English yew longbows had draw weights of up to 100 lb (*c*.45 kg) or 120 lb (*c*.55 kg).

For what they are worth, the depictions of bows from Dura (our only evidence for their appearance) show a considerable variety of types (Figs 17 and 117). Some of the representations are more competently executed than others, but since they were drawn in a city where bows were everyday tools of the hunt and of warfare, I am tempted to give them some general credence, notwithstanding the ever-present danger of the use of artistic conventions. The variety of types may well be due to the variety of dates and of cultural influences at work in the city (Parthian, Roman, Sasanian, Hellenistic, Syrian, Palmyrene, etc.). There is, of course, no reason why a range of types should not have been in simultaneous use at Dura.

Several depictions seem to show bows closely similar to the Yrzi form, with an unbroken sinuous curve when strung (Fig. 117, especially D, F and J). Others show a second distinctive type, with a set-back handle, a sharp outward turn of each limb and straight bow ears (Fig. 117:A and I). This is much more like the modern Turkish and other Asian bows. The probable appearance of such a bow, based on the Dura depictions and modern examples, is shown in Fig. 116:C–E. To which type of bow the Dura laths belonged cannot be determined.

No evidence was identified relating to bowstrings. In later times, these were made from silk or, in England, hemp. Gut or hide were used in the Middle East in recent centuries (E. McEwan, pers. comm.).

To a considerable extent, arrows had to be matched in size, weight and balance to the particular bow, and the bow had to be matched to the archer in depth and weight of draw. For example, a short, strong archer requires a bow with different

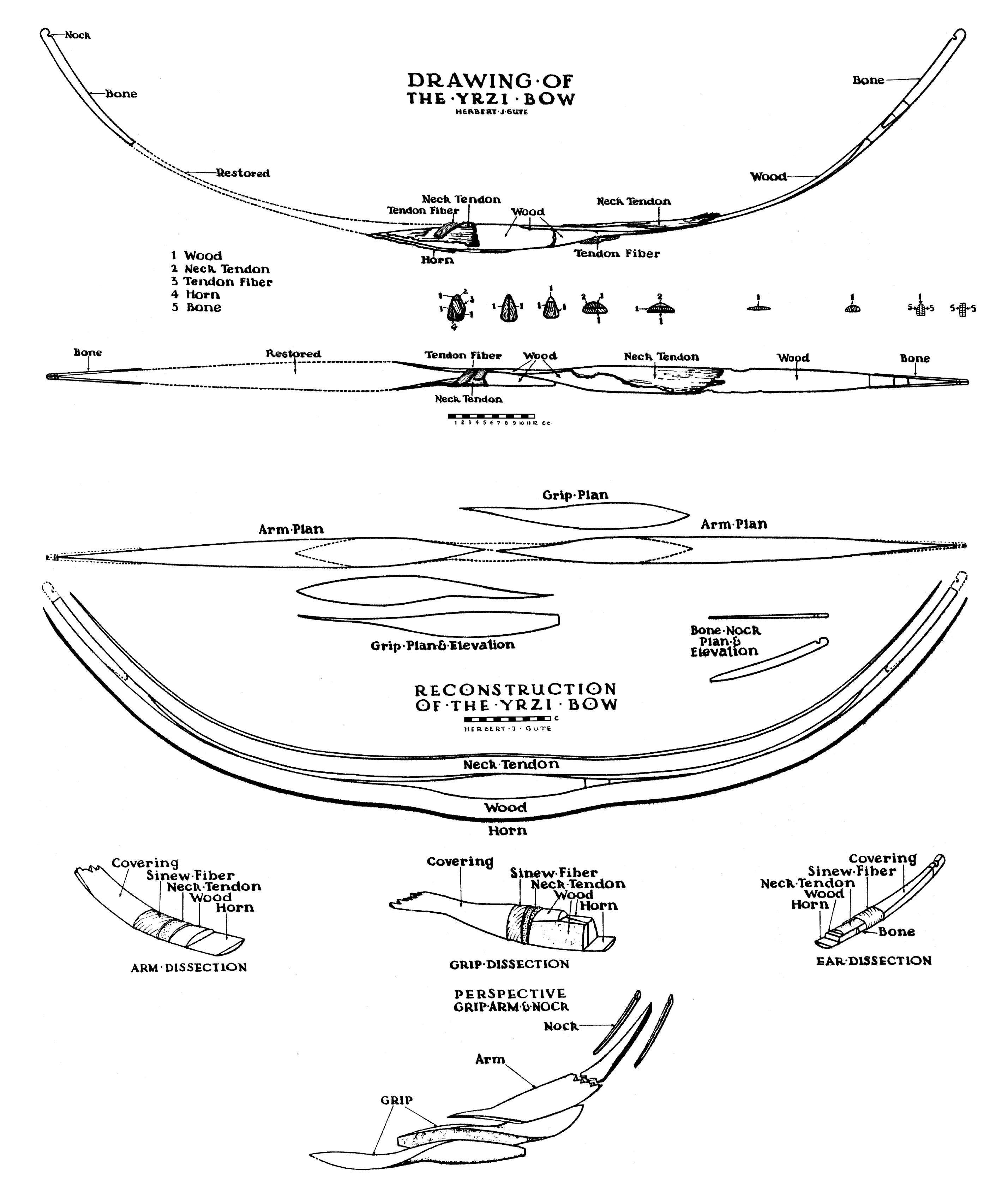


Figure 115 Drawing of the Yrzi bow, and diagrams of its construction (drawn by H. Gute; after Brown 1937).

properties to those required by a tall, weaker archer. Weight of draw is determined by the construction of the bow, especially by the thicknesses of horn and tendon layers, and curvature. These factors can be juggled to get a weapon of appropriate power and depth of draw to allow the archer the proper stance at release. The Dura depictions (Fig. 117) consistently show that the arrow was drawn across the chest, to the region of the right armpit, rather than, for example, to the ear (as with the medieval English longbow). However, this could simply be artistic convention.

Arrows

There are no complete arrows from Dura, but fragments of all parts of the arrow are preserved, from arrowheads to fletching. Arrowheads of both copper alloy and iron were recovered in some numbers.

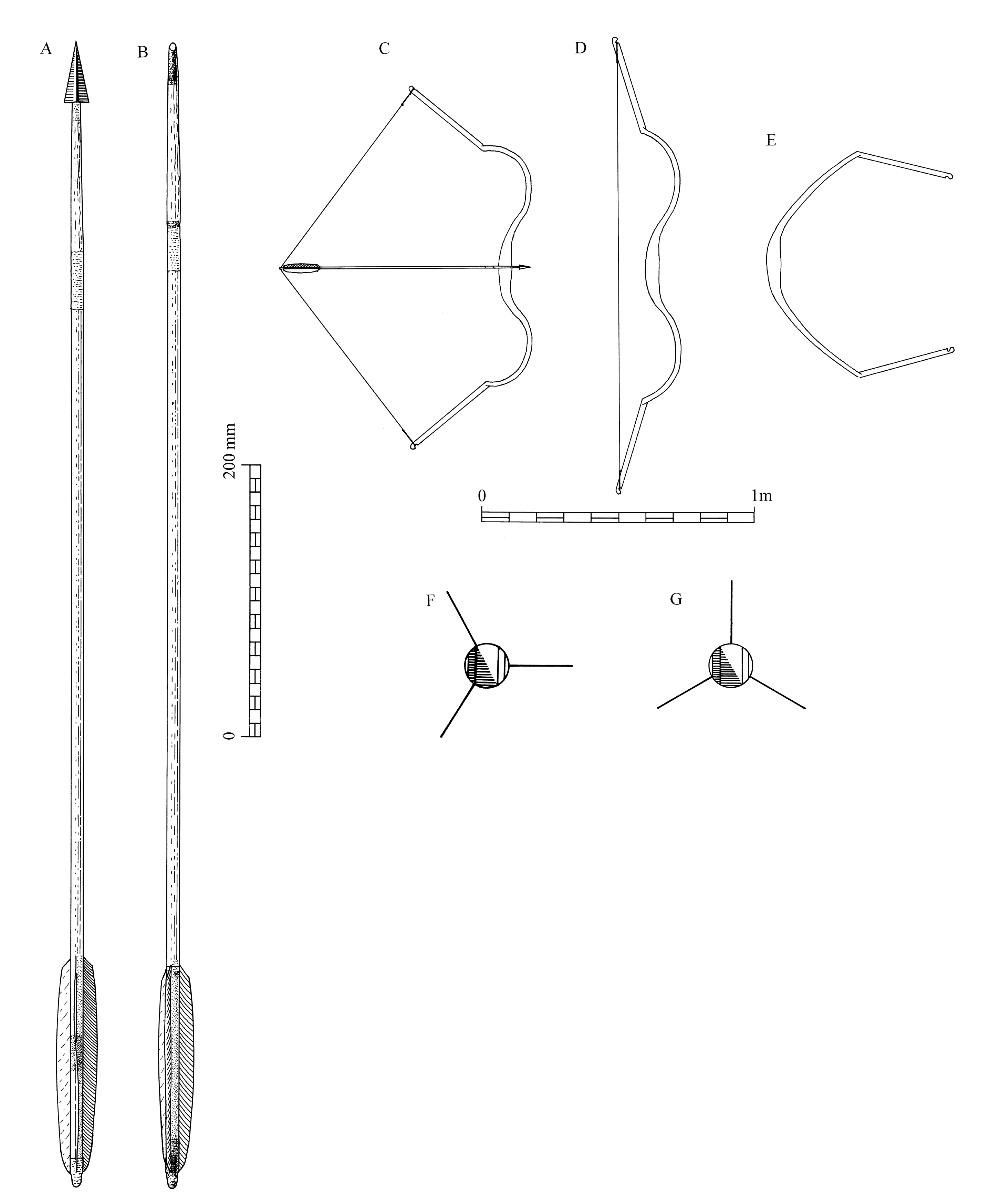


Figure 116 Left: reconstructions of iron-tipped (A) and wooden-tipped (B) arrows at Dura. Top right: a modern composite reflex bow, drawn (C), strung (D), and unstrung (E), showing the extreme degree of flexion possible with such construction. Also shown are diagrams of 'Western' (F) and 'Oriental' (G) fletching arrangements, looking along the shaft from the nock end. Note the horizontal 'cock feather' of the 'Western' arrangement.

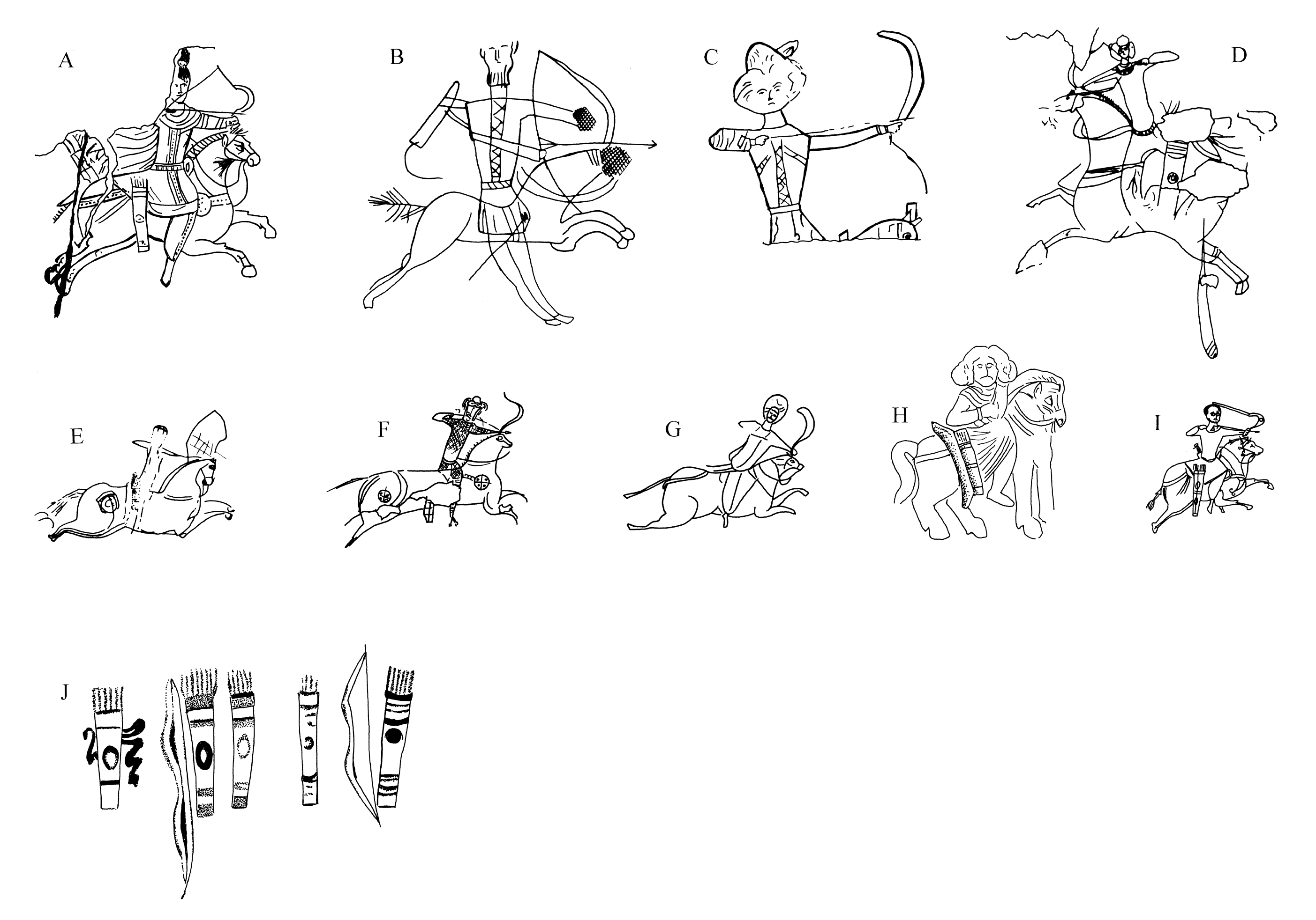


Figure 117 Representations of archery at Dura (see also Fig. 17):
A After a painting in the *mithraeum* (*Rep*. VII/VIII, pl. XIV).
B Graffito (after Cumont 1926, pl. XCVIII).
C As (B).
D Graffito (*Rep*. II, pl. XLI).
E Graffito (*Rep*. IV, pl. XXI:1).
F Graffito (*Rep*. IV, pl. XXI:3).
G Graffito (*Rep*. IV, pl. XXI:2).
H Detail of a relief (*Rep*. VI, pl. XXX).
I Graffito (*Rep*. V, pl. XXXV).
J Detail of bows and quivers from a mural in the Temple of the Palmyrene Gods (Cumont 1926, pl. XVI).

Copper alloy arrowheads

Among the copper alloy arrowheads, a considerable range of types is represented. These fall into two broad groups. Firstly, there are flat, two-bladed types with tangs and no barbs (**654–659**). The remainder (**660–675**) are cast heads with three blades, all socketed except for **660**. Size and proportion vary considerably, especially in the length and profile of the blades. Barbs are lacking, except on **674** and **675**.

The presence of so many copper alloy arrowheads is at first sight surprising, as I know of no evidence for the use of copper alloy rather than iron in the Roman empire as late as the third century AD. (A few copper alloy heads are known from Vindonissa, but none are of forms seen at Dura; see Unz and Deschler-Erb 1997, nos 336–40.) However, some of them are unquestionably residual. **654**, for example, is of a well known Bronze Age type. **661–675** are three-bladed socketed types thought to be of Scythian origin (Sulimirski 1954) which remained in use during the Achaemenid and early Hellenistic periods. It thus seems likely that all the copper alloy arrowheads are residual and date from several centuries before the destruction of the city. None of the arrowheads has a context sufficiently trustworthy to prove that they were current at the time of the siege. Copper alloy arrowheads are easily lost, relatively resistant to decay and are readily spotted during excavation due to their colour. This may partly explain their numbers. While of interest in their own right, all the copper alloy arrowheads may be dismissed from discussion of the Roman occupation and the siege.

Iron arrowheads

With two exceptions (**676** and **677**) all of the iron arrowheads are of the common tanged type with three triangular blades and more or less well defined barbs. The blades are usually placed symmetrically about the axis. These heads required considerable skill to forge, due to their small size, awkward shape and the need for precision of manufacture. **676** and **677** are flat two-bladed heads; **676** resembles post-medieval Turkish types (E. McEwan, pers. comm.), and may be a surface find. The rest of the collection shows considerable variation on the three-blade theme, especially in size, but also in shape and proportions. There is a distinct clustering of blade length

around 35–40 mm, with a range from 25 to 65 mm. How far this pattern represents the preferences of individual archers, or whether different arrowheads performed different tasks, is unclear. **676** may well be an armour piercing form, and the strange double-barbed **708** could be designed for hunting. The latter may be related to an observation in Cassius Dio, that in the first century BC the Parthians 'used double-headed arrow-points, and moreover poisoned them . . . the second iron part, not being firmly attached, would be left in the wound' (Dio, 36.5.1–2).

The seven plain heads found together in tomb 24 (*Rep*. IX.ii, 57, pl. XLVI) had apparently been in a quiver with **708**. It is noticeable from the photograph that they are all extremely similar in size and shape as one would expect, for to shoot consistently an archer needs arrows of consistent weight, balance and aerodynamic performance.

Three-bladed tanged iron arrowheads are extremely common across the ancient world over a prolonged period. A paper by Erdmann has reviewed the evidence, and traced these heads, at least in the eastern Mediterranean world and the Caucasus, far back into the first millennium BC (1976, 6). They seem to have increased in popularity down to the Roman period, during which they were ubiquitous on military sites. Such arrowheads were used by the Roman republican army, and were found at Numantia (von Groller 1927, 252, pl. 34:31–4). Erdmann provides an extensive list of the vast amount of comparative material from early imperial forts in Britain and on the German and upper Danubian *limites* (1976, 7–8; cf. also Davies 1977; Zanier 1988). As Erdmann points out, presence or absence of barbing (which may be defined as the presence of an acute angle between the rear edge of each blade and the tang) is not chronologically significant (1976, 9), and is in any case difficult to assess due to corrosion, which makes me doubtful of the usefulness of the typology proposed by Zanier (1988, 5–6, fig. 1).

Rather closer to Dura are the parallels from caves in the Judaean desert, belonging to the Bar Kochba period (early second century AD: Aharoni 1961, 20, pl. 9B; Avigad 1962, 178, pl. 18C; Yadin 1963, 91, nos 38–40) and to the earlier Jewish War (Masada: Yadin 1966, 16, pl. 23b; and Gamla, dated to AD 67: Gutman 1981, 34). Gamla has produced about 1,500 arrowheads, largely because the excavations were extended outside the walls (G. Stiebel, pers. comm.).

The same type was also in use in the Iranian area from the Hellenistic period onwards (e.g., Aï Khanoum, second century BC, Bernard 1973, 196, fig. 41). It is therefore probable that both sides were using these arrowheads at Dura during the siege, and that some of those recovered by excavation are incoming Sasanian ones, although these cannot be distinguished.

It is not known how long these arrowheads remained in use, but they seem to have disappeared by the medieval period. This is surprising, as three-bladed heads are generally more accurate than flat, two-bladed types. Arrowhead blades act as aerodynamic surfaces, and two-bladed heads are larger and more prone to the effect of crosswinds than three-bladed heads of the same mass. This tendency to drift off-track downwind, a phenomenon known as wind-planing, makes two-blade arrows less accurate, under many circumstances, than three-bladed types (E. McEwan, pers. comm.).

Arrowshafts

All the surviving fragments of shafts exhibit a common construction. All consisted of a basic reed cane about 9 mm in diameter (the stele), with a wooden forepart (footing) of tamarisk (at least in the case of **732**), inserted into the end of the cane and projecting from it 80–130 mm. The sharpened wooden tang inserted into the soft pith of the cane was around 50–60 mm long. The joint between wood and reed was often carefully shaved flush, a process which roughened the surface of the reed and gave purchase to the whipping of glued fibre (said to be shredded tendon, but possibly vegetable in nature) which enveloped the joint and prevented the cane splitting.

The addition of a footing of harder material to the front of the arrowshaft is extremely common practice around the world. Until the introduction of aluminium shafts, good quality target arrows were still given a footing of beefwood, while reed arrows with fibre-bound wooden footings very similar to the Durene examples were made by native Americans (Pope 1962, 74, no. 7, pl. 11 etc.). In the Middle East, such reed and wood shafts were already ancient by the third century AD (*Rep*. VI, 454; wooden-footed arrows were found in Tutankhamun's tomb: Carter and Mace 1963, vol. III, 139, pl. xlvi; and in the Judaean Desert, dating from the early imperial period: Yadin 1963, 91, no. 40; Yadin 1966, 16, pl. 23b). Examples from Vindonissa were made from cherry wood (M. Bishop, pers. comm.; Unz and Deschler-Erb 1997, nos 388–98).

The purpose of the wooden footings on the Dura arrows is not altogether clear. According to the published account, they were designed to aid the addition of socketed iron arrowheads, which could not be directly attached to the reed as it could not be shaped into a point and tended to split (*Rep*. VI, 453). However, the only socketed iron heads found were much too heavy to be arrowheads, and are definitely from catapult bolts. The arrowheads in use during the siege were tanged. However, these too would need a wooden footing, as the tang could get little purchase on the soft core of the reed. The cane would also hinder penetration of the target, as it could not be tapered behind the arrowhead – as could a wooden footing. Shaft fragments **730**–**732** are tapered to the minimum width necessary to hold the tang, and were cut off square. Shafts **730**, and perhaps **731**, provide evidence that tangs had been driven in.

The joint between arrowhead and footing would also have needed a whipped fibre binding, to minimize the kind of splitting seen on **730**; such binding survives on **722** and **728**. The latter pair, however, show no traces of ever having had a tang inserted, and are in fact pointed at the end, a feature which they share with most of the other footings recovered (**720**–**729**). This would make it exceedingly difficult to fit a tanged head to the shaft. In the absence of socketed arrowheads at the time of the siege (unless the copper alloy heads were indeed used, which is highly improbable), some other explanation of **720**–**729** must be sought. The best explanation is that these were not intended to have a metal head at all (although the black paint on the tips of a number of examples may have been intended to suggest iron heads).

Wooden-tipped arrows were in fact very common in the ancient world, and are much more effective than one might think. They are quite capable of transfixing and killing game or

unarmoured men, especially at short range. This is illustrated by the gruesome discovery of the bodies of men killed in a siege in ancient Egypt. They had been shot at very close range by the defenders with arrows tipped only with ebony, admittedly a very hard wood. However, these projectiles were capable of penetrating the skull (Winlock 1945, 11–14, pls V–VII). It is probably erroneous to assume that all arrows had metal tips in the Roman period, as this was not the case either before or since. Arrows tipped with a wide variety of materials, including copper alloy, ivory and glass, as well as wood, were found in Tutankhamun's tomb (Carter and Mace 1963, vol. III, 139, pl. xlvi).

It may be that in Roman times wooden tips were routinely made, but were normally confined to target shooting and hunting. Arrian describes the use of wooden-tipped javelins in cavalry training exercises (*Ars tactica* 34.8, 40.1). It may be suggested that wooden-tipped arrows were the horse archer's equivalent of these javelins. The care with which they are finished and the fact that the arrow maker had leisure to paint them certainly does not smack of desperate measures to replace dwindling ammunition stocks. Such existing projectiles may in any case have been deemed quite adequate for use against the probably unarmoured men who laboured on the Persian siege works. However, it also remains quite possible that some of the arrows, e.g. **722**, **728** and **732**, were in a state of manufacture when deposited and were originally intended to receive metal heads.

Several shaftments (the rear part of the arrow, comprising the fletching and the nock) are preserved (**733**–**738**). The structure of the Dura shaftments was first discussed in *Rep*. VI, 453–5. The following analysis differs from it as a result of my own inspection of the objects preserved at Yale. The method of assembly of all the recovered shaftments was as follows: the end of the shaft was first prepared by roughening the glossy surface of the reed cane, perhaps with sand, in order to give purchase to the glue. The reed was apparently cut at a natural joint, so that the nock could be cut where the cane was solid in section. Before the nock was opened, the last few centimetres of the cane were bound around with glued fibre binding. This prevented the cane splitting when the nock was cut, or when the arrow was placed on the bowstring. Red, black and sometimes white or pink painted decoration (the 'cresting') was then added before fletching.

The purpose of the various crestings applied to the shaftments and footings of the Dura arrows is, of course, unknown. In modern target shooting distinctive cresting patterns allow easy identification of competitors' arrows. It is possible that the Dura crestings were also personal designs, but they may equally well have been unit specific or purely decorative. It is possible that they had some kind of magical significance; the patterns on the nocks of **734** and **735** may represent eyes.

The intact fletching of **733** is, to my knowledge, unique in the empire. The three vanes are long and low, reaching their maximum height near the front, tapering gently and then curving in steeply at the rear end which reaches the edge of the nock. Vanes of similar form are seen on the arrows grasped by Shapur in one of the Bishapur reliefs (Herrmann 1981, pl. 4b). The feathers seem to have been white but are now discoloured. The species has not been identified. They are held on by glue alone, and are spaced equidistantly about the shaft with a recognizable cock-feather at ninety degrees to the axis of the nock (in what is now regarded as the Western style of fletching: Fig. 116:F).

There is no sign that the feathers were deliberately 'corkscrewed' about the shaft to impart spin. Spin provides stability and so enhances accuracy, at the expense of increased aerodynamic drag. However, the natural curvature and twist in the feathers would be sufficient to make the shaft rotate in flight without such measures (**733**, end view). There is no sign of any colour differentiation among the vanes to enable rapid location of the cock-feather when shooting, but this may be due to the ageing of the feathers. The other shaftments, which have all lost their vanes, do possess traces of the positions of the feathers, and usually the bases of the feathers themselves. Shafts **734**–**736** also seem to share the 'western' style of fletching, while **737** and **738** appear to have been fletched in the 'oriental' style, in which one of the feathers is on the axis of the nock (Fig. 116:G). When found, shaft **734** still had part of its fletching intact, but this was subsequently lost.

Since no complete shaft has survived, it is not known how long the arrows were. However, their approximate size can be estimated, as it depends on the style of draw used by the archer and his stature. The depictions at Dura (Fig. 117) consistently show arrows drawn back across the chest to the region of the right armpit, so the arrows must have been as long as the distance between the outstretched left fist and the right side of the chest, plus a few centimetres for the arrowhead which projected beyond the bow. This would obviously vary between archers, but a figure in the region of 800 to 900 mm is suggested. According to Mr E. McEwan the Yrzi bow replica requires arrows of 850–900 mm (pers. comm.). Reconstructions of an iron-tipped and a wooden-tipped arrow are presented in Fig. 116.

Another question is whether these arrows belonged to the attackers or the defenders. Red and black seem to have been the standard colours for arrow crestings from Judaea (Aharoni 1961, 20, pl. 9A and C) to China (Stein 1928, 257, nos LC.v.031–4). Sasanian representations show that contemporary Persian fletching was similar to that seen on **733** (Ghirshman 1962, pls 165–6; Herrmann 1977, pl. 3; 1981, fig. 1, pl. 4; 1983, pls 10–12). However, the provenance of **733**–**735**, which were all sealed between the collapsed floors of Tower 19, makes it almost certain that these belong to the defenders, as the tower was destroyed and these deposits laid down before the fall of the city, and they could not have been shot into the windowless lower rooms of the tower by the attackers (James 1987, 81). These and the closely similar **736** are therefore regarded as belonging to the Roman side.

The remaining pair of shaftments, **737** and **738**, are different. As has been mentioned, they seem to have a different fletching geometry, and also have different nocks. Theirs are square-cut, in contrast to the curved shape of the wings of the nocks on **733**–**736**. They also have distinctive broad red or pink cresting bands. It is tempting to regard these as incoming Sasanian arrows, but the apparent provenance of **738**, which seems to be the arrow found in the Temple of Azzanathkona (*Rep*. V, 166) makes this simple equation unlikely. The shaft was apparently deeply buried in a room where it would be very surprising to find a Persian arrow. In consequence, it does not



Figure 118 The 'Mongolian release', using a thumb-ring.

seem possible to differentiate between Roman and Persian arrows.

Archery tackle

Another rare object in the collection pertaining to archery (other than the remains of bows and arrows) is a broken thumb-ring of polished bone (**652**; *Rep*. II, 73). This is a particularly important find, as it is almost the only direct evidence that the so-called Mongolian release (Fig. 118; Morse 1885), in which the bowstring is pulled back by the thumb, was in use in the Roman empire, or at least on its borders, as early as the third century AD. At the time of its original publication (James 1987), I was unaware of a sketch in the Yale archives which includes a clear drawing of the thumb-ring among a group of objects interred with a burial of classical date in the citadel, proving that such rings were known in the Middle East during the period.

The group of eight arrowheads found in tomb 24 had been held tightly together, for some had fused to each other (**689–691** and **708–710**; *Rep*. IX.ii, 57, pl. XLVI). They had probably been in a quiver of some organic material, most likely leather, of which no trace survived. A leather tube, plausibly identified as the mouth of such a quiver, does survive (**653**). No archaeological remains of bow cases were recovered, or at least, none were recognized with any degree of certainty. A bone plaque, decorated with a relief depicting elks, has been argued to be from a bow case (*Rep*. VII/VIII, 376–81, fig. 85, pl. XXXIX:1). However, the representational evidence suggests that bow cases were soft and flexible (see below).

The depictions of mounted archers from Dura show quivers slung behind the rider's right leg (Fig. 117:A, H and I). The same location is seen on the tombstone of Flavius Proclus from Mainz (Selzer 1988, 158, no. 90; Speidel 1994, pl. 1). The quivers hang low, with the shaftments of the arrows exposed and in easy reach of the rider's right hand. From their position, the quivers seem to have been attached to the horse harness rather than a waist-belt; this was certainly the practice at Palmyra (Colledge 1976, pl. 102). Quivers of very similar form, slung in the same position but from a loose waist-belt, are seen on early Sasanian rock-carvings (e.g. Herrmann 1977, 77). This location was not universal; one of the Dura graffiti (Fig. 117:B) shows a mounted archer with a quiver apparently slung across his shoulders in the manner more usually expected of foot archers.

These quivers are tapered slightly from top to bottom, to allow plenty of space for the fletching at the top. They were of round rather than box section (Fig. 117:H), and would have been about 600 mm high (the length of the arrow minus the fletching), and, if the depicted proportions are right, about 150 mm across at the top and *c*.100 mm at the bottom. Most of the depictions show bands around the top, middle and bottom of the quiver, with circles in between, perhaps partly representing painted decoration. Whether these features are functional, or just decorative, is unknown. They may well be ties for bow cases (see below). The leather tube **653** corresponds closely to these images in size, shape, painted decoration and in having a group of holes in the appropriate place for ties to attach it to the harness.

Some representations from Dura show horse archers not engaged in shooting, and consequently without a bow in their hands (Fig. 117:H). In each example, behind the quiver is an object which is almost certainly a bow in its case. The bow case was probably of fabric or some other flexible material which could be folded up and stowed away when the bow was in use. This is confirmed by the surface appearance of the bow cases depicted in the synagogue, which looks like much-folded and crumpled cloth. It would also account for the absence of bow cases on the other horse archer depictions, all of which show riders shooting. Judging from its position on the horse, when filled the bow case seems to have been tied to the back of the quiver, and this is apparently confirmed by a Palmyrene relief showing a bow case with ties (Colledge 1976, pl. 43). From the curved rear edge of the bow case, it is clear that the bow was unstrung when packed away. This is not strictly necessary for composite bows, which, unlike self bows (i.e. with bow-staves cut from a single piece of wood), can be left strung for extended periods without damage (E. McEwan, pers. comm.). If the interpretation is correct, and the bow was unstrung when packed away (as the shape of the bow case seen in Fig. 117:H implies), then the bows were evidently similar to the Yrzi weapon (Fig. 115), with a gentle unstrung curve, in contrast to the extreme curvature exhibited by more recent bows (Fig. 116:C to E).

Archery at Dura

The horse archer was a key element of warfare in the Middle East from the Parthian period onwards, and depictions at Dura show bowmen mounted both for warfare and hunting. Before Dura fell to the Romans it was garrisoned by Palmyrene archers (Welles *et al*. 1959, 24), and under Roman domination it continued to be manned by forces largely comprised of bowmen, including the *cohors II Ulpia equitata civium Romanorum sagittariorum*. Its best-known unit, *cohors XX Palmyrenorum*, also probably included a high proportion of archers, although there is no clear evidence that it was entitled *sagittariorum* (Welles *et al*. 1959, 24, *contra* Zanier 1988). However, archery was a skill taught to legionaries as well as auxiliaries (e.g. Balty 1988, 101 for a legionary archer buried at Apamea). The Sasanians were also largely dependent on bowmen, especially horse archers, in warfare (e.g. Dio 40.15).

Many of the archers who probably made up a large proportion of the Roman garrison would have been shooting with the bow since childhood, on foot or horseback. Depictions of mounted archers shooting at full gallop and often turning round to shoot backwards from the saddle (the famous

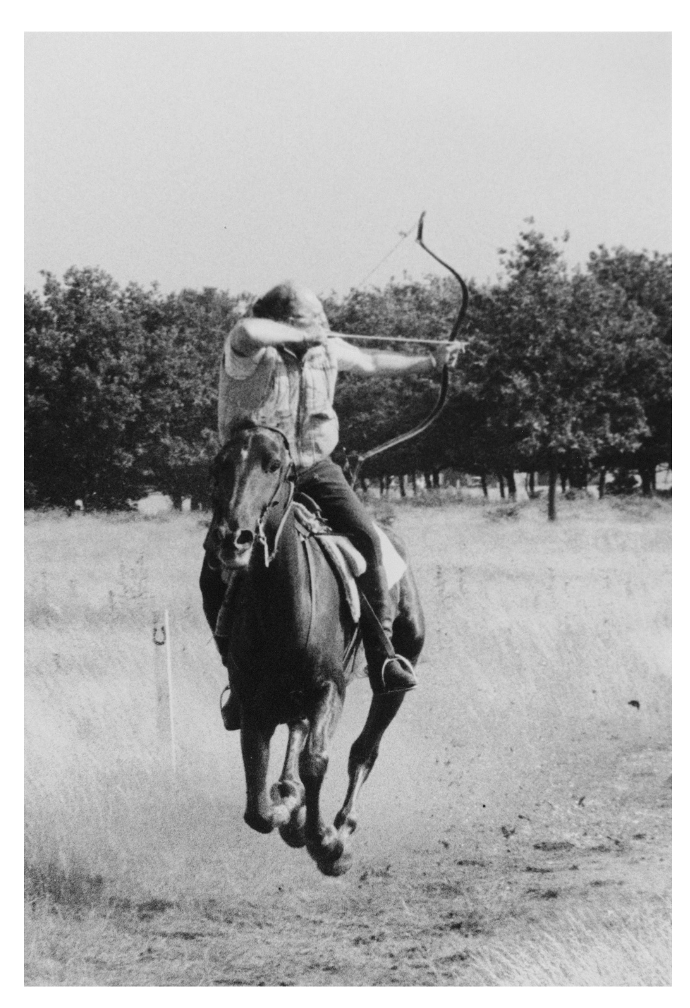


Figure 119 Shooting with a composite reflex bow from horseback: demonstration by Mr E. McEwan.

'Parthian shot': Rostovtzeff 1943) are common in the ancient world. Such manoeuvres were spectacular, although according to Mr E. McEwan, an experienced archer who regularly shoots from horseback, it is actually easier to shoot at the gallop than at the trot or canter, as the much smoother motion of the horse more than compensates for the increased speed when it comes to accuracy, even in the absence of stirrups (Fig. 119; see Connolly 1986 and Herrmann 1989 on the secure seat provided by Roman and Partho-Sasanian saddles).

It is likely that many archers at least fletched their own arrows, and may well have made their own shafts, but the complex wrought iron heads would have required a skilled blacksmith. Units like *XX Palmyrenorum* may well have had their own specialist arrowsmith, and probably a bowyer as well. It requires great skill and experience to make a composite reflex bow. It is a time-consuming business, taking several months from start to finish. For example, the layers of tendon applied to the back of the bow each take six weeks to dry out, and there must usually be at least two such layers (information from E. McEwan, pers. comm.; Coulston 1985, 248–59).

The exact method of shooting used at Dura may be identified with some degree of confidence. In most parts of the world, the bowstring is drawn back with the fingers. A particularly common method of drawing is for the first three fingers to rest on the string, with the nock of the arrow between the index and middle finger. This is the so-called Mediterranean release, which is thought to have been the one in standard use in the classical world (Rausing 1967, 28).

However, the discovery in a stratified context at Dura of a broken thumb-ring (**652**) proves that the 'Mongolian release', in which the string is drawn back by the thumb, was known in the Middle East by the third century AD; previously the thumb-ring was thought not to have reached the Roman empire until much later (Coulston 1985, 275–8). Furthermore, the design of the arrows found in certain contexts proves that the Mongolian release was used by the Roman defenders (*Rep*. VI, 453; James 1987). The traces of fletching on all the preserved shaftments extend right back to the edge of the nock (**733–738**). If the bowstring was drawn with the fingers, holding the arrow to the string, the rear end of the fletching would be crushed, clearly an absurdity (*Rep*. VI, 453). In fact, in areas where the string is drawn in this way (e.g. modern Europe), the fletching is stopped short of the nock, leaving a space of 25 mm or more to allow the fingers to fit between vanes and the bow string (Payne-Gallway 1907, 13). Clearly the Dura arrows, many of which as we have seen certainly belong to the defenders, were shot using the Mongolian release. The thumb, of course, cannot hold the arrow, which rests on the string above it. A ring, such as that recovered from Dura, is worn over the ball of the thumb to protect the skin as the string slides over it on release (Fig. 118; Morse 1885, 16; von Luschan 1891). Traditionally, in Europe the arrow rests on the left side of the bow, with the cock-feather pointing away from the archer's body. In oriental archery the arrow has no cock-feather and the bow is held upright, the arrow passing to the right of the bow. In this style of shooting the bow string does not strike the left wrist, so no protective bracer is needed on the forearm.

Such early evidence for use of the Mongolian release in the Roman empire is certainly very interesting, as it was thought to have reached the Mediterranean world only with the Huns in the fifth century (Coulston 1985, 275–8), even though thumb-rings from China show that it was known in Asia before the Han period (Pope-Hennessy 1923, 74–6, pl. 50; Rawson and Ayers 1975, 63, no. 171). Whether it was in general use among Roman *sagittarii* is unknown, but the fact that no Roman thumb-rings have been identified in Europe suggests that it was confined to the Eastern frontier zone, despite the transfer of many units of supposedly oriental archers to the West over the centuries. Unfortunately the rare detailed depictions of archers from Western sites do nothing to resolve the matter. The Housesteads archer tombstone lacks sufficient detail (Webster 1985, pl. XVI), while the portrayals of oriental archers on Trajan's Column are as prone to the distortions of Hellenistic artistic convention as any of the other figures, and thus are not trustworthy (Webster 1985, pl. XXI; Watson 1969, pl. 1).

Catalogue: Bows, arrows and archery tackle

Bows and archery tackle

648
Bone bow lath
Provenance unknown
Yale no. 1938.717
Dura no. unknown
Length 94 mm+

A damaged bone tip lath or nock plate from a composite reflex bow. Probably only a third or less of its original length is preserved.

It has a smooth outer face with a very rough, flat inner side designed to give good purchase to the glue holding it to the wooden core of the bow. There would have been a pair of such laths at either end of the bow.

These terminal reinforcements are common finds throughout the Roman empire and into Asia. The closest known parallel to the Dura examples in space as well as time is the Yrzi bow, a Parthian bow found near Dura (Fig. 115; Brown 1937). Considerable numbers of bow laths are known from Roman military sites as far from Dura as Bar Hill in Scotland (Robertson *et al.* 1975, 56, fig. 18), South Shields (Allason-Jones and Miket 1984, 37, 39, nos 2.16, 2.18), Vindonissa (Unz and Deschler-Erb 1997, nos 407–20), Valkenburg on the lower Rhine (Glasbergen and Groenman-van Waateringe 1974, pl. 15:2), and Intercisa, Carnuntum and Vindobona on the Danube (Salonen and Barkoczi 1982, 171, fig. 16; for Carnuntum see *RLÖ* II, pl. XXIV; III, pl. VIII:12–13; XXXI, pl. XVI:16–17). For general accounts of such compound bows, see Rausing 1967 and Payne-Gallway 1907; for a detailed survey of the Roman evidence and catalogue other known laths see Coulston 1985, 224–34.

649
Bone bow lath
Provenance unknown
Yale no. 1938.716
Dura no. unknown
Length 86 mm+

Incomplete.

650
Bone bow lath
Provenance: 'K2-main street'
Yale no. 1938.715
Dura no. K568
Length 81 mm+

Incomplete. Probably a broken tip lath, but possibly from the grip. Note both faces are roughened, to ensure good bonding to the bowstave and to the glued tendon binding which completely covered the composite structure of the weapon.

651
Bone bow lath
Provenance unknown
Yale no. 1938.713
Dura no. unknown
Length 78 mm+

Incomplete.

652
Broken archer's thumb-ring of bone
Provenance unknown
Yale no. 1929.475a
Dura no. unknown
Length 39 mm+, width 31.5 mm, width of aperture *c.*24 mm, height 11 mm
Russell 1976, 56, no. 6

Described but not illustrated in *Rep*. II, 73, where it is described as 'certainly Parthian', though no reason is given for this statement. Published in James 1987, 78, figs 1–2. The ring is clearly depicted among a group of objects sketched on a sheet preserved at Yale. These are labelled as coming from a classical period burial in the north-western tower of the citadel.

Although half of the ring has been lost, the remaining fragment is in an extremely good state of preservation.

Thumb-rings were well established in China by the Han period (Pope-Hennessy 1923, 74–6, pl. 50; Rawson and Ayers 1975, 63, no. 171). At what date they arrived in western Asia, and when they reached the classical world, are disputed questions. For shooting with a thumb-ring (the 'Mongolian release') see Morse 1885 and von Luschan 1891.

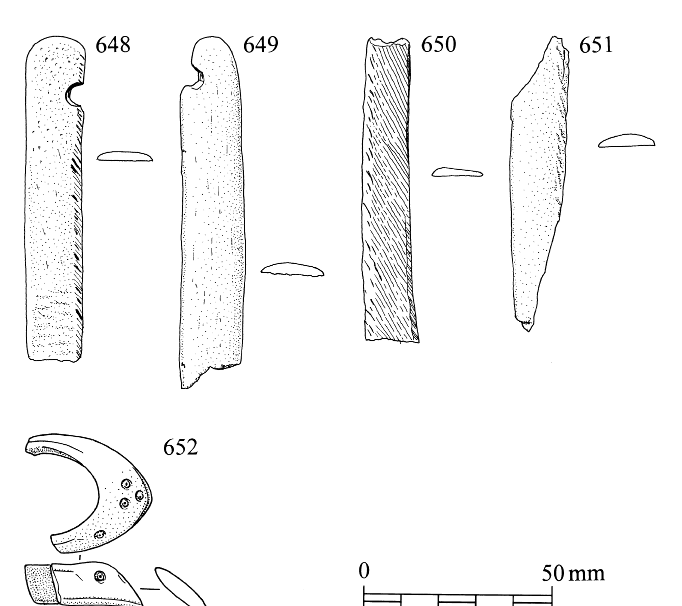


Figure 120 Bone laths from composite bows **648** to **651**, and thumb-ring **652**.

653
Leather quiver
Provenance unknown
Yale no. 1933.472
Dura no. unknown
Height 275 mm+, diameter 90–150 mm
Described in Kaplan 1971, 4, 5, 21–2, no. 49

The leather, a seamless tube, appears to be the skin of the neck of a young camel, apparently vegetable-tanned according to Gansser-Burckhardt (Kaplan 1971, 4, 21). One end is cut square, the other eaten away. Originally painted red and black, the pattern was already too faded to reconstruct when found (Kaplan 1971, 5), and has now vanished. It has a square pattern of four round holes, *c.*8 mm in diameter, arranged in two pairs *c.*165 and 200 mm from the rim respectively.

No archaeological parallels are known.

Arrows

Copper alloy arrowheads

654
Leaf-shaped tanged copper alloy arrowhead
Provenance unknown
Yale no. 1938.2543
Dura no. unknown
Length 60 mm

An early Bronze Age type (Salonen 1965, pl. XXXV).

655
Leaf-shaped tanged copper alloy arrowhead
Provenance unknown
Yale no. 1938.2538
Dura no. unknown
Length 29 mm+

Probably Bronze Age.

656
Flat two-bladed tanged copper alloy arrowhead
Provenance unknown
Yale no. 1938.2540
Dura no. unknown
Length 39 mm+



Figure 121 Probable quiver **653**.

Flat on one side, slightly ridged on the other. Probably Bronze Age.

657
Flat two-bladed tanged copper alloy arrowhead
Provenance unknown
Yale no. 1938.2541
Dura no. unknown
Length 56 mm+

Probably Bronze Age.

658
Triangular two-bladed tanged copper alloy arrowhead
Provenance: K7-W5
Yale no. 1938.2532
Dura no. G1378
Length 71 mm

659
Leaf-shaped two-bladed tanged copper alloy arrowhead
Provenance: B3 court
Yale no. 1938.2554
Dura no. G1468
Length 98 mm

This object was not located at Yale. The drawing is from a photograph on a record card in the Yale catalogue. It is clearly related to **658**.

660
Three-bladed tanged copper alloy arrowhead
Provenance unknown
Yale no. 1938.2542
Dura no. unknown
Length 36 mm+

661
Three-bladed socketed copper alloy arrowhead
Provenance: N8 W10*
Yale no. 1938.2534
Dura no. H334*
Length 32 mm
* Probable identification.

The socket projects well beyond the end of the blades. Such socketed three-blade heads were universal in the Middle East by the seventh century BC (Snodgrass 1964, 151, fig. 10, type 3B1 and references). There is a similar head from Aï Khanoum (Bernard 1973, 195, fig. 41:29).

662
Three-bladed socketed copper alloy arrowhead
Provenance: G1-5
Yale no. 1932.1519
Dura no. E93
Length 32 mm

663
Three-bladed socketed copper alloy arrowhead
Provenance: ' E7-outside W wall'
Yale no. 1932.1520
Dura no. E575
Length 35 mm

Similar to **661** and **662**, except that the blades are larger and extend further down the sides of the socket. See **661** for parallels.

664
Three-bladed socketed copper alloy arrowhead
Provenance: D7
Yale no. 1932.1521
Dura no. E1158
Length 50 mm

Similar to **663**, but more elongated.

665
Three-bladed socketed copper alloy arrowhead
Provenance: Citadel I, 8–9
Yale no. 1933.687b
Dura no. F1861
Length 41 mm

Similar to **663**, but with rounded shoulders.

666
Three-bladed socketed copper alloy arrowhead
Provenance unknown
Yale no. 1938.2548
Dura no. unknown
Length 22 mm+

The short socket protrudes only slightly beyond the ends of the round-shouldered blades. The apparently triangular section is probably largely due to heavy corrosion.

667
Three-bladed socketed copper alloy arrowhead
Provenance unknown
Yale no. 1938.2537
Dura no. unknown
Length 32 mm

Short socket similar to **666** but sharply defined shoulders similar to **664** and **665**.

668
Three-bladed socketed copper alloy arrowhead
Provenance unknown
Yale no. 1938.2533
Dura no. unknown
Length 41 mm

The socket projects only slightly, as in **666** and **667**, but the blades have regularly curved edges, the head reaching its greatest width at the mid-point rather than to the rear.

669
Three-bladed socketed copper alloy arrowhead
Provenance: M8-W6
Yale no. 1933.687a
Dura no. F1879
Length 39 mm

Similar to **668**, except that the blades run right to the edge of the socket.

670
Three-bladed socketed copper alloy arrowhead
Provenance unknown
Yale no. 1936.2536
Dura no. unknown
Length 38 mm

Similar to **669**, except that the blades are more triangular than curved. This type was used by the Achaemenid Persians by 500 BC (Erdmann 1976, 9, pl. 1), and became the commonest type in Greece in the fifth century BC (Snodgrass 1964, 153, fig. 10, type 3B3; Olynthus: Robinson 1941, pl. CXXV:2089 etc.). An example of presumably Hellenistic date was found at Aï Khanoum (Bernard 1973, 197, fig. 14:31–2).

671
Three-bladed socketed copper alloy arrowhead
Provenance unknown
Yale no. 1938.2535
Dura no. unknown
Length 36 mm

Similar to **670**. The blades terminate in different positions, and are relatively broad.

672
Three-bladed socketed copper alloy arrowhead
Provenance unknown
Yale no. 1938.2545
Dura no. unknown
Length 32 mm+

673
Three-bladed socketed copper alloy arrowhead
Provenance: L8-W101*
Yale no. 1938.2547
Dura no. D30*
Length 19 mm+
* Details drawn from a site record card preserved at Yale which almost certainly refers to this object.

674
Three-bladed barbed and socketed copper alloy arrowhead
Provenance unknown
Yale no. 1929.618
Dura no. unknown
Length 37 mm

This head is of plain triangular section near the tip, while towards the rear the blades are divided from the socket by a groove and terminate in well-defined barbs projecting to the rear of the socket rim. Similar to three examples in the Melgunov treasure, from the early sixth century BC (Barnett 1962, 85, pl. VI).

675
Three-bladed barbed and socketed copper alloy arrowhead
Provenance unknown
Yale no. 1929.619
Dura no. unknown
Length 24 mm

Similar to **674**, but shorter and with less well defined barbs which are cut off square with the socket rim.

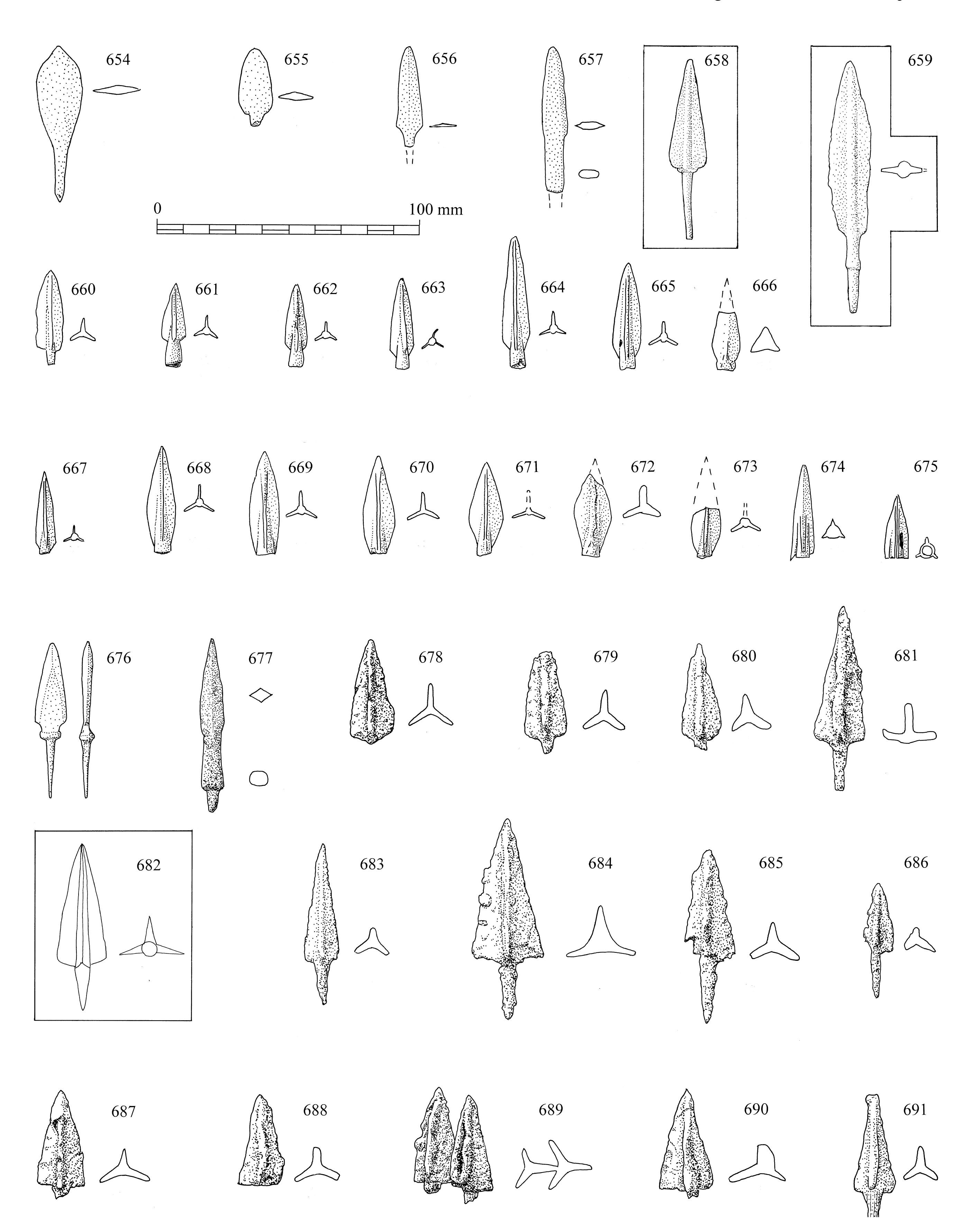


Figure 122 Arrowheads in copper alloy (**654** to **675**) and iron (**676** to **691**).

Iron arrowheads

676

Triangular two-bladed collared and tanged iron arrowhead
Provenance: Tower 19 or ‘C3’ (?)*
Yale no. 1938.5999.1125
Dura no. F2137*
Length 60 mm
* The site record card preserved at Yale has ‘C3’ added in pencil, so the provenance of this object is uncertain. However, it appears in a photograph purporting to show objects found in Tower 19 (*Rep*. VI, pl. XXIV bottom row, extreme right).

No good parallels are known. An arrowhead published by Pope and said to be from Syria is fairly close (1962, 79, pl. 14:8). It is similar to modern Turkish arrowheads (E. McEwan, pers. comm.). Given the doubt over its provenance, it could be a surface find of medieval or later date.

677

Leaf-shaped tanged iron arrowhead
Provenance: Tower 19 or ‘M8-W6’*
Yale no. 1933.691
Dura no. F1533*
Length 67 mm+
* This object appears in a photograph labelled ‘finds from Tower 19’ (*Rep*. VI, pl. XXIV bottom row extreme left), but the site record card preserved at Yale from which these details are taken gives the provenance as ‘M8-W6’.

The tang appears to be broken. The nearest parallel is also apparently from Syria (Pope 1962, 79, pl. 14:7).

678

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1938.5999.1097
Dura no. unknown
Length 40 mm+

The tang is lost, the blades apparently unbarbed. This is the most common type of arrowhead found on Roman military sites (e.g. Vindonissa: Unz and Deschler-Erb 1997, nos 336–58). More arrowheads of this type were recovered recently from excavations before the Palmyrene Gate (Gelin *et al*. 1997, 41, fig. 31). For general discussions, see Erdmann 1976, and Davies 1977. Parallels from Britain come from Newstead (Curle 1911, 189, pl. XXXVIII), Bar Hill (MacDonald and Park 1906, 115–16, fig. 42), and many others (list in Davies 1977). There are also parallels from Palestine: Gamla (dated to AD 67, Gutman 1981, 34), Iotapata (Adan-Bayewitz and Aviam 1997, 143, fig. 13), Masada (Yadin 1965, 16, pl. 23B; 1966, 57), Nahal Tse’elim (second century AD: Aharoni 1961, 20, pl. 9C), Wadi Muraba’at (second century AD: Avigad 1962, 178, pl. 18C, fig. 7:5), and elsewhere in the Judaean desert (Yadin 1963, 91, nos 38–40). The type was also in use in the territory of the Hellenistic, Parthian and Sasanian empires, and as far east as Afghanistan (Aï Khanoum: Bernard 1973, 196, inv. 028, fig. 41), and Taxila (Marshall 1951, pls 165:18, 206:41–2).

679

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1930.619c
Dura no. unknown
Length 39 mm+

The tip and tang are damaged.

680

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1934.443f
Dura no. unknown
Length 41 mm+

The tang is broken.

681

Three-bladed tanged iron arrowhead
Provenance: E8-23
Yale no. 1938.5999.1092
Dura no. H113
Length 71 mm

Similar to **678–680**, but larger and with blades positioned according to bilateral rather than radial symmetry. This is a deliberate feature of manufacture. See **682**.

682

Three-bladed tanged iron arrowhead
Provenance: B3 court
Yale no. 1938.5999.1126*
Dura no. G1468A
Length 64 mm
* Known only from a site record card with scale drawing in the Yale archives.

683

Three-bladed tanged iron arrowhead
Provenance: M8-W2
Yale no. 1938.5999.1089
Dura no. F512
Length 62 mm

Relatively long and slender.

684

Three-bladed tanged iron arrowhead
Provenance: E8-62
Yale no. 1938.5999.1087
Dura no. H311
Length 77 mm

A particularly large and broad arrowhead with moderately defined barbs. The section, apparently similar to those of **681** and **682**, is probably the result of post-depositional distortion.

685

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1932.1722
Dura no. unknown
Length 66 mm

A smaller version of **684**.

686

Three-bladed tanged iron arrowhead
Provenance: H1-15
Yale no. 1938.5999.1091
Dura no. H848
Length 44 mm

A smaller version of **684** and **685**.

687

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1938.5999.1094
Dura no. unknown
Length 41 mm+

The tang is lost.

688

Three-bladed tanged iron arrowhead
Provenance: Necropolis tomb 24, loculus XIV (?)*
Yale no. 1938.5999.1102
Dura no. unknown
Length 35 mm+
* Probably to be identified with *Rep*. IX.ii, 57, nos 43–9, pl. XLVI (second from right).

The tang is lost.

689

A pair of three-bladed tanged iron arrowheads
Provenance: Necropolis tomb 24, loculus XIV*
Yale no. 1938.5999.1093
Dura no. unknown
Lengths 41 mm+ and 42 mm+
* These are to be identified with part of a group of arrowheads published in *Rep*. IX.ii, 57, nos 43–9, pl. XLVI (left).

The two heads are fused together by corrosion. The tangs are snapped, and the blades split by oxidation processes. The stumps of the tangs both retain traces of wood grain from the shafts in their surface corrosion products.

690

Three-bladed tanged iron arrowhead
Provenance: Necropolis tomb 24, loculus XIV (?)*
Yale no. 1938.5999.1095
Dura no. unknown
Length 42 mm+
* Possibly to be identified with *Rep*. IX.ii, 57, nos 43–9 and pl. XLVI (third from left).

The tang is lost.

691

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1934.443e
Dura no. unknown
Length 53 mm

The tang retains traces of wood grain from the shaft in its corrosion products.

692

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1938.5999.1101
Dura no. unknown
Length 38 mm+

The tang is lost.

693

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1934.443c
Dura no. unknown
Length 53 mm

Like **684–692**, but the barbs are better defined.

694

Three-bladed tanged iron arrowhead
Provenance unknown
Yale no. 1938.5999.1067
Dura no. unknown
Length 86 mm

An exceptionally long arrowhead.

695

Three-bladed tanged iron arrowhead
Provenance: N7-W2
Yale no. 1934.443b
Dura no. G1929
Length 50 mm

Similar to **693**. Traces of wood grain are preserved on the tang. Heavily corroded. The section was originally like that of **694** etc.

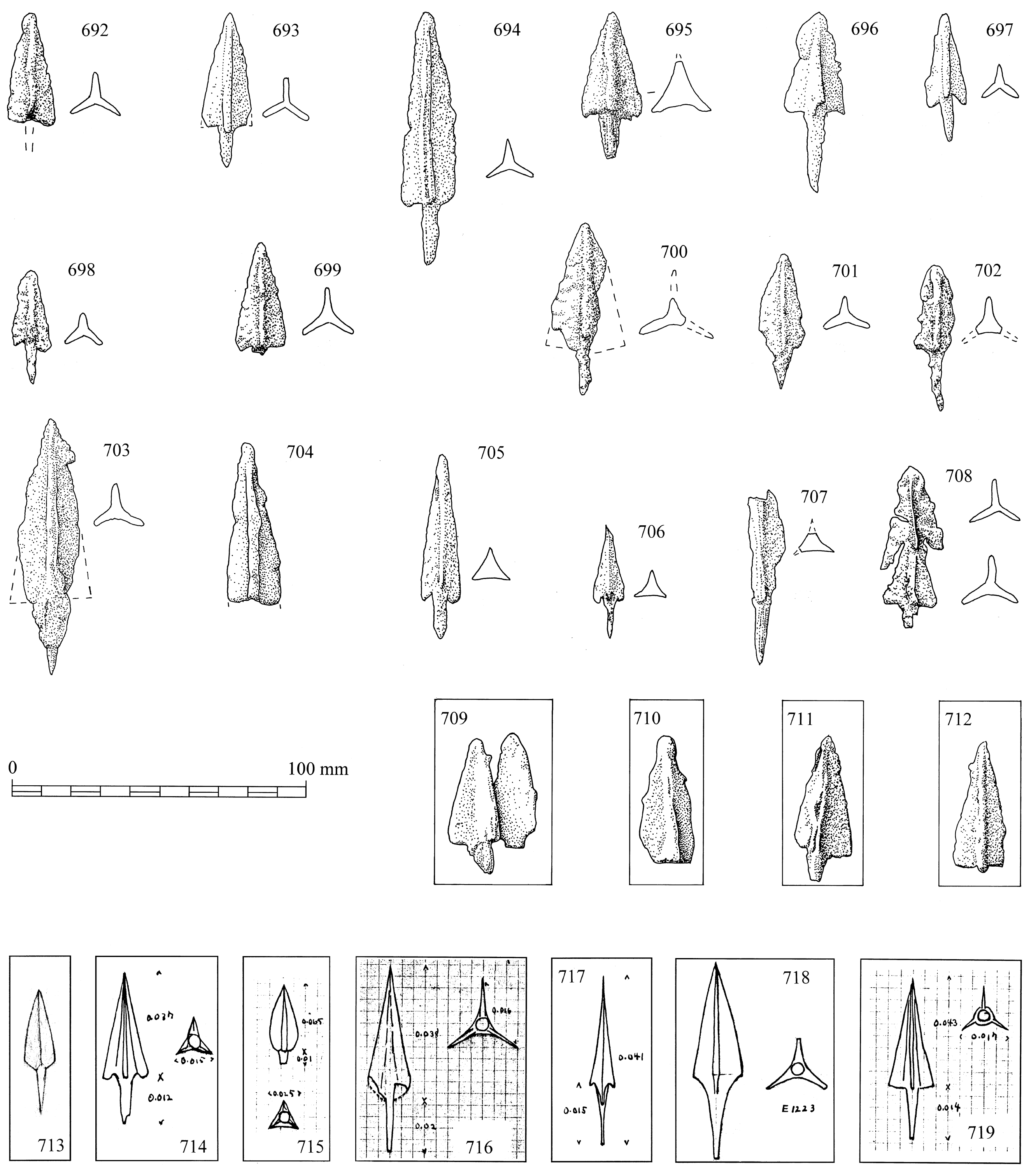


Figure 123 Iron arrowheads **692** to **719**.

696

Three-bladed tanged iron arrowhead

Provenance: 'G3 Dump' *
Yale no. 1934.443d
Dura no. G216
Length 61 mm

* Provenance from a site card preserved at Yale which bears a drawing of this object. Large concretion on tip. Similar in form to **695**.

697

Three-bladed tanged iron arrowhead

Provenance unknown
Yale no. 1938.5999.1127
Dura no. unknown
Length 44 mm

A smaller version of **693**, **695–696**, etc.

698

Three-bladed tanged iron arrowhead

Provenance unknown
Yale no. 1938.5999.1099
Dura no. unknown
Length 39 mm

Similar to **697**.

699

Three-bladed tanged iron arrowhead

Provenance unknown
Yale no. 1938.5999.1096
Dura no. unknown
Length 38 mm+

Similar to **695**, **696**, etc.

700

Three-bladed tanged iron arrowhead

Provenance: D4-T2
Yale no. 1938.5999.1090
Dura no. H534
Length 58 mm

All the blades are damaged, so their form is uncertain.

701

Three-bladed tanged iron arrowhead

Provenance: L3-B7
Yale no. 1938.5999.1088
Dura no. F2132
Length 41 mm

All the blades are damaged, so their form is uncertain.

702

Three-bladed tanged iron arrowhead

Provenance unknown
Yale no. 1938.5999.1098
Dura no. unknown
Length 50 mm

All the blades are damaged, so their form is uncertain.

703

Three-bladed tanged iron arrowhead

Provenance: M8-W8
Yale no. 1934.443a
Dura no. G1917
Length 88 mm

Heavily corroded; all the blades are broken.

704

Three-bladed iron arrowhead

Provenance unknown
Yale no. 1938.5999.1034
Dura no. unknown
Length 55 mm+

Presumably originally tanged, this blade is now apparently broken at the rear.

705

Three-bladed tanged iron arrowhead

Provenance unknown
Yale no. 1938.5999.1128
Dura no. unknown
Length 63 mm

This arrowhead differs from **678**–**704** in its section, which seems to have been a convex-sided triangle, even allowing for corrosion products.

706

Three-bladed tanged iron arrowhead

Provenance unknown
Yale no. 1938.5999.1100
Dura no. unknown
Length 39 mm

A smaller version of **705**, with the same triangular section.

707

Three-bladed tanged iron arrowhead

Provenance unknown
Yale no. 1938.5999.1104
Dura no. unknown
Length 59 mm+

Similar to **705**, but severely damaged around the tip and blades. There are traces of wood grain around the tang.

708

Three-bladed double-barbed and tanged iron arrowhead

Provenance: Necropolis tomb 24, loculus XIV
Yale no. 1938.5999.1103
Dura no. unknown
Length 55 mm+
Published in *Rep*. IX.ii, 57, no. 50 and pl. XLVI

At the time of discovery this arrowhead still had its tang, now lost. The peculiar arrangement of double barbs is unique, to my knowledge. It may be a specialized hunting head designed to cause maximum injury to large game in order to incapacitate it as quickly as possible.

709

Pair of three-bladed tanged iron arrowheads

Provenance: Necropolis tomb 24, loculus XIV
Location unknown
Dura no. unknown
Dimensions unknown
Published in *Rep*. IX.ii, 57, nos 43–9, pl. XLVI (fourth and fifth arrowheads from the left)

A pair of arrowheads fused together like **689**, with which they were found.

710

Three-bladed tanged iron arrowhead

Provenance: Necropolis tomb 24, loculus XIV
Location unknown
Dura no. unknown
Dimensions unknown
Published in *Rep*. IX.ii, 57, nos 43–9, pl. XLVI (third from right)

The tang is lost.

711

Three-bladed tanged iron arrowhead

Provenance: Tomb 37, loculus X
Location unknown
Dura no. unknown
Dimensions unknown
Published in *Rep*. IX.ii, 72, pl. LI (left)

The tang is damaged. Similar to **687**.

712

Three-bladed tanged iron arrowhead

Provenance: Necropolis tomb 37, loculus X
Location unknown
Dura no. unknown
Dimensions unknown
Published in *Rep*. IX.ii, 72, pl. LI (right)

The tang is lost. Similar to **681** or **683**.

713

Three-bladed tanged iron arrowhead

Provenance: Necropolis tomb 46*
National Museum, Damascus (?)*
Dura no. K454*
Length 41 mm
* Information from a site record card at Yale, annotated 'Dam.'.

Largely intact head, similar to **686** and **698** in size, but barbs ill-defined or damaged.

714

Three-bladed tanged iron arrowhead

Provenance: 'B2-So. dump'
Location unknown
Dura no. unknown
Length 49 mm
Described on a site card preserved at Yale

715

Three-bladed tanged iron arrowhead

Provenance: M8-W8
Location unknown
Dura no. G1920 or G1930
Length 75 mm+
Described on a site card preserved at Yale

The apparently rounded blades were probably damaged.

716

Three-bladed tanged iron arrowhead

Provenance: N8-W1
Location unknown
Dura no. probably G879
Length 58 mm
Described on a site card preserved at Yale

Blades damaged.

717

Three-bladed tanged iron arrowhead

Provenance: N8-W1
Location unknown
Dura no. G725
Length 41 mm
Described on a site card preserved at Yale

Probably like **705**.

718

Three-bladed tanged iron arrowhead

Provenance: G1-12 (?)
Location unknown
Dura no. E1223
Length apparently 67 mm
Described on a site card preserved at Yale

Like **678** to **680**, but complete.

719

Three-bladed tanged iron arrowhead

Provenance: B3–4
Location unknown
Dura no. unknown, possibly G1968
Length 57 mm
Described on a site card preserved at Yale

Fragments of arrowshafts of reed and wood

720

Broken shaft of reed and wood

Provenance: 'N8-Ramp' *
Yale no. 1938.5999.1071
Dura no. unknown
Length 300 mm+
* A site record card preserved at Yale bears a sketch and dimensions of an object which corresponds exactly to this, so presumably they are the same object. The above provenance is recorded above the sketch.

It is a large fragment of an arrowshaft of reed cane, 10 mm in diameter, into the end of which is inserted a tapered wooden footing or foreshaft which forms the front part of the arrowshaft. In form the footing resembles **724**, **725**, etc. After insertion of the wooden tang into the pith of the reed, the joint was shaved flush with a sharp blade and whipped around with a binding of shredded fibre (tendon?) soaked in glue to prevent splitting. The exposed length of footing is 131 mm and the surviving portion of reed cane is 169 mm long.

The footing tapers gently from 10 to 5 mm and terminates in a faceted point. There is no aperture for a tanged metal arrowhead, nor any mark left by a socket. It is likely that the wooden point was the actual warhead of the arrow. Decoration consists of black paint on the first 27 mm of the footing, bounded by a narrow band of red, 2.5 mm wide. A second red band, 1.5 mm wide,

was added immediately above the junction of footing and reed. The wood of the footing is probably tamarisk.

Arrowshafts of cane with wooden footings were standard in the ancient Middle East, and were already in use in Egypt from the Old Kingdom onwards (*Rep*. VI, 438; Carter and Mace 1963, vol. III, 139, pl. xlvi). Much closer parallels come from Judaea, especially the second century AD examples from Nahal Tse'elim, which had tanged wooden footings thrust into cane shafts with anti-split bindings. They were similar in length to the Durene examples (140–200 mm), but were untapered. Some had binding around the tip to hold a tanged arrowhead (Aharoni 1961, 20, pl. 9:A and C). Another arrow of the same period was found in another cave and had a similar untapered footing with bound joint (Avigad 1962, 178, pl. 18C). The first-century AD fortress at Masada also produced some shaft fragments with iron arrowheads still attached. These appear to be wooden footings, and have a slight taper. The tips are bound (Yadin 1965, 16, pl. 23B; Yadin 1966, 57). Another, with a three-bladed iron head, was found at Qasr Ibrim, Egypt (British Museum, EA 71840). Footings similar to the Durene ones were also found at Vindonissa, suggesting that this aspect of arrow design was quite standard across the Roman world (Unz and Deschler-Erb 1997, nos 388–98).

721
Broken shaft of reed and wood
Provenance: L7-W*
Yale no. 1938.5999.1065
Dura no. F1801 (part of)*
Length 235 mm+
* Details from a site card preserved at Yale.

Apparently found with **722** and **723**. A fragmentary shaft identical in construction and decoration to **720**. The reed is a little thinner (9 mm) and has been hollowed out by post-depositional insect action. The junction of the footing and cane is identical to that of **720** except that there is no sign of surface shaving. The anti-split binding and band of red paint are like those on **720**. About 108 mm of cane survives. The footing is 164 mm long overall, of which 127 mm projects from the reed. Its tip is slightly faceted, probably from knife-trimming, and is painted like **720**, with 23 mm of black and a 3 mm band of red.

722
Broken shaft of reed and wood
Provenance: L7-W*
Yale no. 1938.5999.1066
Dura no. F1801 (part of)*
Length 178 mm+
* Details from the site record card mentioned under **721**. Apparently found with **721** and **723**.

A fragmentary shaft identical in construction to **720**, with intact whipping around the first 43 mm of cane. The reed is 10.5 mm thick. The junction was shaved before the whipping was applied, perhaps to roughen the surface for gluing as well as to smooth the profile of the shaft. The length of surviving cane is 83 mm, and the exposed length of the wooden footing is 95 mm. The latter tapers from 10.5 to 5 mm. Its tip was apparently faceted and lacked any aperture for an arrowhead tang, but was bound around with glued fibre (tendon?) whipping, perhaps indicating that it was intended to have such a head but that it was never fitted. Like **720** and **721**, the first 24 mm are painted black. There is no red band.

723
Broken shaft of reed and wood
Provenance: L7-W*
Yale no. 1938.5999.1064
Dura no. F1801 (part of)*
Length 149 mm+
* Details from the site card mentioned under **721**. Apparently found with **721** and **722**.

Structurally identical to **720–722**. The broken end is burnt. The remaining fragment of cane is 31 mm long, the exposed part of the wooden footing 118 mm. The latter tapers and has a faceted tip like **720** and **721**. The first 24 mm are painted black.

724
Wooden arrow footing
Provenance unknown
Yale no. 1931.591b
Dura no. unknown
Length 180 mm

Originally 118 mm projected from the reed shaft. The remaining 62 mm forms the tapered and pointed plug or tang for insertion into the soft pith of the reed cane or stele which made up most of the shaft. The front part also tapers, as on **720–723**. The first 22 mm are painted black.

725
Wooden arrow footing
Provenance: E7-W
Yale no. 1932.1716
Dura no. E1245
Length 173 mm

Identical in form to the footings of **720–723**. Length of plug 71 mm; projecting part 102 mm. At least the first 10 mm were painted red. Beyond this the paint has flaked off, except for traces 19 and 22 mm from the tip which may be from 1 mm wide bands. The wood bears 'chatter marks' from the tool used to shave it into a taper.

726
Wooden arrow footing
Provenance: Tower 19*
Yale no. 1933.448b
Dura no. unknown
Length 129 mm+
* This is to be identified with the left hand footing of the pair from Tower 19 published in *Rep*. VI, 454, pl. XXIV.

Identical in shape to **724** except for the lost plug or dowel. It originally projected 115 mm from the end of the reed. The tip is faceted and lacks any aperture for an arrowhead tang. The first 23 mm is painted black.

727
Wooden arrow footing
Provenance unknown
Yale no. 1934.502a
Dura no. unknown
Length 135 mm+

A snapped-off footing identical to those of **720** and **721**, originally projecting 130 mm from the reed shaft, and tapering from 7 mm to 5 mm. It bears light faceting from the knife. There is no aperture for a tanged arrowhead. The first 27 mm are painted black, bordered by a 2 mm red band. A second band of red, also 2 mm wide, was applied just above the junction with the reed.

728
Wooden arrow footing
Provenance unknown
Yale no. 1938.5999.1068
Dura no. unknown
Length 128 mm+

Like **727**, snapped off at the junction with the reed. It tapers from 9 to 6 mm. The first 24 mm are painted black, bounded by a 2.5 mm band of red. The tip is roughly faceted, and has no tang aperture. However, traces of glued fibre (tendon?) whipping adhere to the tip, as on **722**, perhaps indicating that it was intended to add an arrowhead.

729
Wooden arrow footing
Provenance unknown
Yale no. 1938.5999.1072
Dura no. unknown
Length 77 mm+

Broken like **726–728**. It had originally projected 71 mm from the cane. Part of the binding around the joint still adheres to the base. The object differs from **720–728** in being much shorter, more crudely finished and unpainted. The wood is knotted. The first 29 mm have been roughly whittled, probably with a fairly blunt knife.

730
Wooden arrow footing
Provenance unknown
Yale no. 1931.591c
Dura no. unknown
Length 123 mm

Complete. Originally projecting 84 mm from the reed shaft, with a dowel inserted 39 mm into the cane. Unlike **720–729**, it is cut off square and is split, probably as a result of having a tanged arrowhead driven into it. Unpainted.

731
Wooden arrow footing
Provenance unknown
Yale no. 1931.591d
Dura no. unknown
Length 145 mm

Complete. Originally projecting *c*.97 mm from the reed shaft. The end is cut off square, with a central aperture which may have been to take a tanged arrowhead but which was certainly subsequently enlarged by insect action. Unpainted.

732
Wooden arrow footing
Provenance: Tower 19*
Yale no. 1933.448a
Dura no. F1963
Length 165 mm
* To be identified with the right-hand footing of the two from Tower 19 published in *Rep*. VI, 454, pl. XXIV.

The published account identifies the wood as tamarisk. Complete, but split. It originally projected *c*.115 mm from the end of the reed shaft. The end is cut square, but has no sign of a tang aperture. It may therefore have been unfinished when deposited. The tip was painted black for at least the first 17 mm.

733
Reed shaftment with intact fletching (Figs 124 to 126)
Provenance: Tower 19
Yale no. 1933.445a
Dura no. unknown
Length 278 mm+
Published in *Rep*. VI, 453, no. 1, pl. XXIV (top left); James 1987, 78, figs 3 (bottom) and 4

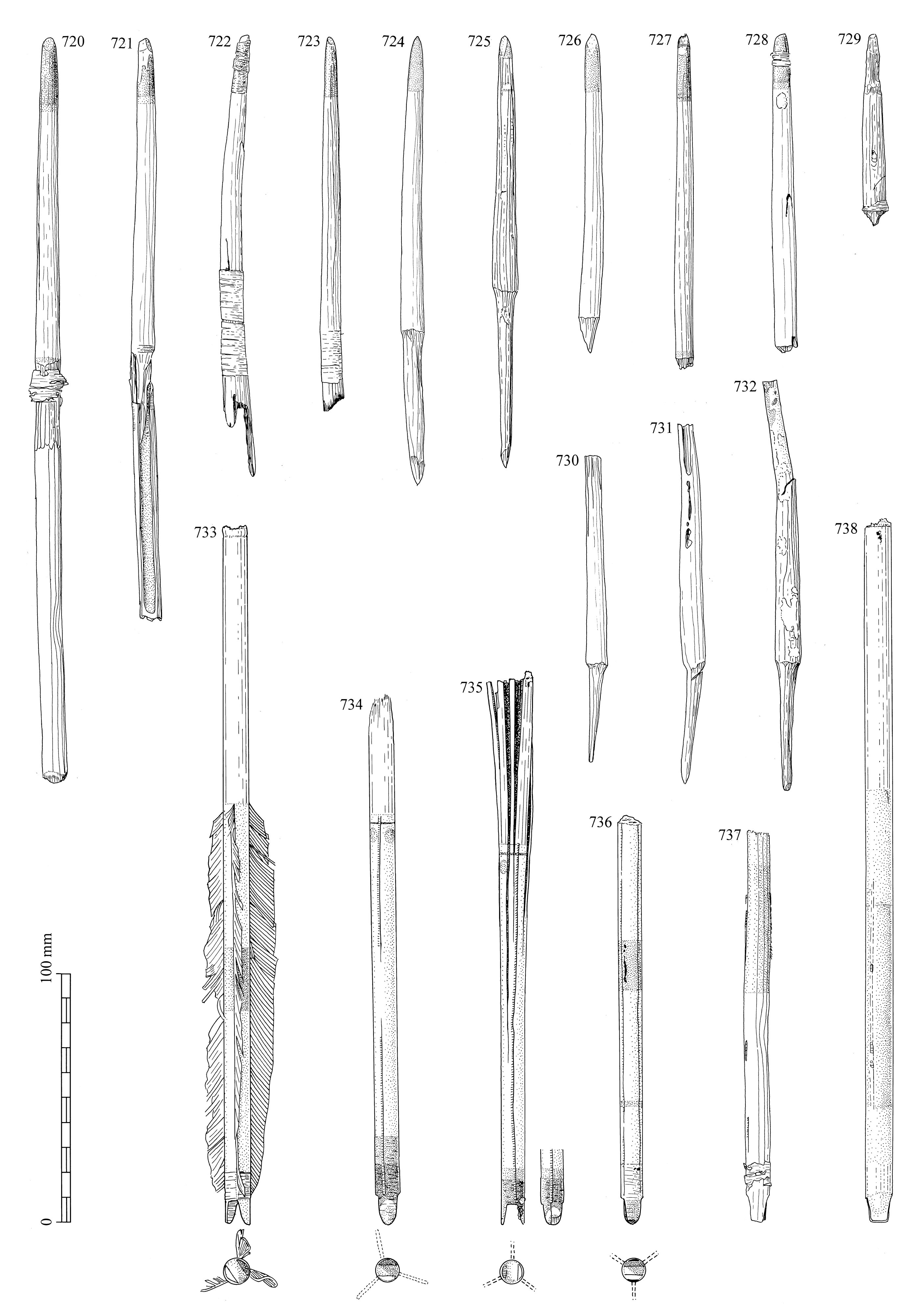


Figure 124 Arrowshaft fragments: **720** to **732**, wooden footings and fragments of reed shafts; and **733** to **738**, reed shaftments and feather fletchings.



Figure 125 Shaftments **733** (with fletching) and **734**.



Figure 126 Shaftments **733** (with fletching) and **734**, detail. Note whipping to prevent shaft splitting and painted decoration.

The detailed description given in the *Report* is substantially correct. The reed cane, 10 mm in diameter, is snapped cleanly at a natural joint. The nock, 9–10 mm deep, is cut at a similar joint, where the cane is solid in section. In profile the wings of the nock are curved. A whipping of shredded fibre (tendon?) in glue was wound around the end and allowed to set before the nock was cut to prevent the cane splitting during manufacture or shooting. The published account states that the length of shaft bearing the flights or vanes was sized with glue, while the plain part of the shaft was varnished. I believe this to be a misinterpretation. These canes seem to have a naturally glossy surface which has to be roughened by sanding or scraping to give glue purchase. There is no visible trace of either applied size or varnish. Rather the glossy cane was simply roughened along the length which was due to take the fletching.

Before the fletching was added the shaft was given painted decoration (the 'cresting'). This consisted of a simple broad band of red paint, 25 mm wide.

Three vanes were applied. The species is not identified. They seem to have been white, although this could simply be due to ageing. Each was 157 mm long and reached a maximum width of 11–12 mm. The fletching runs back over the anti-split binding, up to the edge of the nock. The arrangement of the vanes is according to the 'Western' style of fletching, with a cock-feather set at right-angles to the axis of the nock, and a hen-feather at 120 degrees to either side of it. The feathers were held on by glue alone. They were not attached with a deliberately 'corkscrewed' geometry to make the arrow spin. Their bases were glued parallel with the axis of the arrow, but the natural curvature of the feathers would have been enough to make the shaft spin anyway (see drawing).

The only other example of an arrowshaft with intact fletching known to me from the classical world is an unpublished piece, possibly Roman, from Qasr Ibrim, Egypt (British Museum, EA 71841). Some shaftments now without vanes also survive from Palestine. These second century AD examples from the cave at Nahal Tse'elim in the Judaean Desert also possess red and black crestings like the Dura examples (Aharoni 1961, 20, pl. 9:A and C). Reed arrows with bound nocks and red and black crestings are found over a huge area of Asia, over a long period. Some of the best parallels are from the *'limes'* of the Han Chinese empire (broadly contemporary with Dura) and its successors (Stein 1921, 785, Txix.006–7, pl. LIII; 783, Txv.a.vi.001; and especially Stein 1928, 95, nos 046–8; 96, nos 0635–7, pl. VI; 202, L.M.1.07, pl. XXVI; 257, LC.v.031–4, pl. XXVI; 422, Txliii.01, pl. XLVII).

734

Reed shaftment (Figs 124–126)
Provenance: Tower 19
Yale no. 1933.445b
Dura no. unknown
Length 218 mm+
Published in *Rep*. VI, 453, no. 2 and pl. XXIV (top, middle), and James 1987, 78, fig. 4

When found, it had much of its fletching intact. Unfortunately this has since been lost. The cane is 10 mm in diameter. In construction, it is identical to **733**. The nock is 8 mm deep. The vanes were *c.* 151–2 mm long. The surviving photographs suggest that they were broadly like those on **733** in shape. Their geometry

was also the same, with a recognizable cock-feather. The vanes were not corkscrewed.

The cresting is more elaborate than that on **733**. The last 18 mm of the shaft were painted black, overlying the nock and anti-split binding. This was bounded by a 4 mm wide red band. A large white spot was painted on each wing of the nock, and a smaller red one within, making an 'eye'. About 4 mm inside the ends of the vanes is a 1 mm wide black band. Next to it is a 5 mm diameter red spot between each vane.

735

Reed shaftment
Provenance: Tower 19
Yale no. 1933.445c
Dura no. unknown
Length 209 mm+
Published in *Rep*. VI, 453, no. 3, pl. XXIV (top right) and James 1987, 78, fig. 3 (centre right) and 4

The broken end is scorched from the fire in the tower. The fletching is lost, except for the roots of the feathers held to the shaft by the glue. The vanes were 151 mm long. Structurally identical to **733**, with cresting identical to **734**. The cane is 9.5 mm thick, the nock 11 mm deep. The anti-split binding around the nock stretches 30 mm along the shaft and is totally covered in paint. Black covers the last 24 mm, and is bounded by a band of red 11 mm wide. The wings of the nock each bear a white spot, 11 mm long, and on that a red spot *c*.7 mm long. The inside of the nock is also painted red. Towards the leading edge of the vanes are a narrow black band and red spots identical to those on **734**. Arrangement of the vanes is as on **733** and **734**, and they were of course added after the cresting.

736

Reed shaftment
Provenance: L7-W*
Yale no. 1938.5999.1070
Dura no. F1801 (part of?)*
Length 163 mm+
* Identified with an object described on a site card at Yale. Published in James 1987, fig. 4, right.

Of cane, 9 mm in diameter, structurally identical to **733** etc. The fletching, as on the above examples, reached to the base of the nock. The vanes are lost, except for their bases which still adhere to the shaft. The nock is 10 mm deep and covered in anti-split binding. The vanes reached at least as far as the broken end and thus were at least 150 mm long. They were arranged as on **733**.

The cresting is again red and black, but of a different type. The wings and interior of the nock are red, except for the outsides of the tips which are black. A 2 mm wide red band surrounds the shaft 46 mm from the end, and another, 20 mm wide, starts 94 mm from the end.

737

Reed shaftment
Provenance unknown
Yale no. 1938.5999.1069
Dura no. unknown
Length 158 mm+

Structurally identical to **733–736**, made of reed 9.5 mm thick. The nock is 10 mm deep. The traces of the fletching are intermittent, but the vanes were at least 120 mm long. As usual they were fixed with glue alone. However, they seem to have been attached in the 'oriental' style, with no cock-feather as such. One of the vanes is parallel to the nock, the others are 120 degrees to either side. The wings of the nock are squared.

The cresting consists simply of a broad band of black pigment, starting 92 mm from the end, and continuing for 51 mm, followed by a pink band. The width of the latter is unknown as the shaft is snapped, but it was at least 15 mm.

738

Reed shaftment
Provenance: E7-W13*
Yale no. 1932.1685*
Dura no. E1206*
Length 284 mm+
* The object bears no number, but its details tally perfectly with those on a card in the Yale catalogue, which gives these details.

Of cane, 11 mm thick, with a nock 9 mm deep. It probably had anti-split binding at the nock, but this has fallen off, taking the overlying paint with it. Few traces of the fletching survive, but the vanes were at least 120 mm long and were arranged as on **737**. The record card says they were 151 mm long. The last 173 mm of the shaft are painted. Starting at the nock, there is 46 mm of very pale pink, then 82 mm of black, followed by another 45 mm of the pink. The wings of the nock are squared.

739

Reed shaftment with intact fletching (not illustrated)
Provenance: L7-W
Location unknown
Dura no. F1801 (part of)

On a site record card with **736**. Of uncertain length, this shaft was broken off before the end of the fletching. It had the usual anti-split binding, and white vanes apparently similar to those of **733**. The nock wings were painted 'solid deep red'. The reed was 7.5 mm thick.

740

Reed shaft with wooden footing (not illustrated)
Provenance: 'N8-Ramp'
Location unknown
Dura no. unknown
Length 320 mm+
Recorded on a site card with **720** and **741**

A reed shaft, surviving to 257 mm, with a wooden footing projecting a further 63 mm. The junction is bound, as on **720–723**.

741

Wooden arrow footing (not illustrated)
Provenance: 'N8-Ramp'
Location unknown
Dura no. unknown
Length 170 mm+
Recorded on a site card with **720** and **741**

An intact arrow footing, identified as tamarisk. The tip was apparently painted black. It projected 115 mm from the reed shaft. Similar to **720–728**.

Torsion artillery

The use of torsion artillery, especially in siege warfare, was standard in the Roman world. The machines themselves are quite well understood in many ways, as a result of the study of surviving technical treatises (e.g. Marsden 1969), of the ever expanding archaeological record (especially the work of Baatz; see below) and of experimental reconstructions at the Saalburg and elsewhere (Schramm 1980). Large quantities of what is clearly catapult ammunition have been recovered from Dura, so it is evident that artillery played a major role in the siege. Both arrow-shooters and stone-throwers of various sizes were used.

Machines

No parts of machines were recognized in the collections. This was disappointing, given the recent spate of new discoveries and the recognition of components in existing collections across the entire Roman world and beyond.

In recent years there has been a modest explosion in archaeological discoveries and identifications of catapult parts, mostly of imperial date, right across the empire and beyond. Components have been identified at Gornea and Orsova on the Danube and at Hatra in Mesopotamia (Baatz 1978), Cremona (Baatz 1980), Lyons (Baatz and Feugére 1981), Ephyra (Baatz 1982), Pityus (Baatz 1988) and in the Mahdia shipwreck (Baatz 1994a; all these papers are reprinted in Baatz 1994b). Other finds of components from light arrow-shooters have been made in Mauretania, including a spring frame from Sala (Boube-Piccot 1994, no. 465) and two washers from Volubilis (Boube-Piccot 1994, nos 466–7). Another late republican spring frame, from La Caridad, Spain, was also recently published (Vicente *et al*. 1997). Probable catapult washers from Burgh Castle are to be seen in Norwich Castle museum.

All these finds notwithstanding, the absence of such remains from Dura is not particularly surprising. Catapults are not likely to have become buried in the siege except in exceptional circumstances like the collapse of Tower 19, and any surviving the fall of the city would very likely have been removed by the victors. It is also quite possible that some of the great quantity of unidentified lumps of metal come from casings or other parts of machines, yet to be commonly recognized. So far, the only characteristic components regularly identified are washers, iron spring frames and perhaps winder ratchets (Ephyra: Baatz 1982, 227). Trigger mechanisms, for instance, have yet to be recognized anywhere and probably will not be until a machine is found complete with stock and slider.

However, some relevant remains may have been found at Dura, but not preserved. ‘Several skeins of sinew, ready made . . . [were] found in several of the towers. These were about one foot long, according to Professor F.E. Brown who discovered them . . .’ (Wright 1963, 179). Unfortunately, there are no details other than this personal communication. No note of such skeins was found in the Dura archive. This is particularly distressing, as if they really were from machines, these would be the first actual catapult springs to be identified.

Artillery bolts

A considerable number of iron tips and short wooden shafts from projectiles were discovered during the course of the excavations. At least one shaft had an iron head attached when found (**810** and possibly also **830**). These were eventually identified as bolts from light arrow-shooting machines, and there seems to be every reason to accept the identification. To date, these are the only substantially complete bolts ever found, although a few fragments are known from Europe (Haltern: Dahm 1903, Schramm 1905; Vindonissa: Simonett 1942). I have identified another wooden foreshaft for a bolt remarkably similar to the Rhine discoveries from Qasr Ibrim, now in the collections of the British Museum’s Department of Egyptian Antiquities (James and Taylor 1994, 95).

The known shafts and iron tips represent up to about a hundred projectiles.

Iron bolt-heads

Many loose iron projectile points were found. Most of these were socketed, while some were tanged. Evidently too heavy to be from ordinary arrows, they were variously identified as bolt tips or javelin-heads. Over sixty can be accounted for in the Yale holdings and the Royal Ontario Museum. Several distinctive types can be identified. There are three main variants: socketed bodkins, tanged bodkins and leaf-shaped heads. There is also a solitary example of a specialized type of ammunition, identified as an incendiary head.

It was not possible to weigh the pieces due to the unavailability of accurate scales, although the tremendous variation in completeness and degree of oxidation removes much of the value of such data with regard to identifying possible ammunition modules or calibres (p. 213). However, an unspecified number of heads found in the second season weighed between 39.0 and 62.1 g (*Rep*. II, 72) while seventeen found in the sixth season weighed between 50.6 and 62.3 g (*Rep*. VI, 455).

Many of the socketed bodkins had been attached to wooden shafts before deposition. Some retained pieces of the shaft, or at least traces of wood grain, in the socket (e.g. **745**, **746** and **750**). Some just retained the fastening nail *in situ* (**742–744**). Many have empty nail holes, some have no nail holes at all. A group of these were apparently found together in the Palmyrene Gate, and it was suggested that they had just come from the forge, and were not yet ready for shafting (*Rep*. II, 7). It is noteworthy that none of the leaf-shaped tips have a trace of a fastening hole, perhaps suggesting that this is a feature characteristic of the type.

Some bodkins were damaged at the tip in a manner suggesting that they had been shot (e.g. **749**).

Socketed bodkins

The commonest type was the socketed bodkin, generally with an elongated pyramidal head and a split socket, usually with traces of a fastening nail (**742–779** and **782**). There are variations on the theme: three had heads of circular section (**779–781**), while the unwaisted **776–778** had unusually large sockets. These may not be from artillery bolts, but may have served some other purpose, such as ferrules from spears. Their similarity to an object interpreted as a ground spike, probably from a standard, emphasizes the difficulty of identification (**644**). The socketed bodkin shape was used for spear butts long before the invention of artillery (Erdmann 1982, 9–10), and finds of iron and copper alloy ferrules of this basic form from many Roman forts shows that the practice continued. But while their size and the simplicity of their shape makes the function of these objects far from absolutely certain, the small size of most of the Durene examples, and the fact that many bolt shafts and no javelin shafts were found, means that in general the identification may be accepted (*Rep*. II, 72). The issue is further complicated by the discovery of two heads, possibly socketed bodkins, in the Tower 19 countermine, where they can hardly have been employed on catapult bolts (p. 188). It is possible that they were employed on makeshift weapons designed for fighting in the confined spaces of the mine.

Tanged bodkins

Some thirteen examples were identified (**783–792** and **793–794**). The earlier, fragmentary bolts from Europe and Egypt also had tanged heads. At least one wooden shaft from Dura had also been fitted with one (**816**). This is a very common type in the Roman empire (see catalogue for parallels).

Leaf-shaped bolt-heads

The strange, diamond-sectioned **795–803** might be light javelin heads, but their general size, heavy tip and especially the diameter of their sockets, makes it equally likely that they are from a variety of catapult bolt. Some have distinct shoulders (**796** and **801**).

This type is in fact also known on Roman sites in the West (see catalogue), but is not commonly recognized as a Roman bolt type, perhaps because it is easily confused with medieval crossbow projectile forms.

Incendiary bolt-head

One of the most remarkable objects in the Yale collection is an incendiary head, a form of specialized ammunition for siege warfare, presumably used for the destruction of siege engines or defensive works and buildings in the town (**804**; James 1983). There can be little doubt about the identification, as it corresponds perfectly with descriptions in ancient sources (Brok 1978; *Malleolus*: Ammianus 23.4.14–15; and in a third-century context, Eusebius, *History(?)*: Jacoby 1926, no. 101. 481, 2–29). This find of an incendiary bolt was thought to be unique, although bow-shot incendiary arrowheads have been known for many years (see James 1983 for full discussion). However, I am now aware of several finds from Slovenia (see catalogue).

The socket diameter matches the standard bolts found at Dura. However, it is possible that the shaft used with this head had to be longer, or needed larger flights, to overcome the destabilizing effect of the additional mass and aerodynamic drag engendered by the cage and combustibles so near the front end. In any case, its range would probably have been less than that of conventional bolts because of these factors.

Wooden bolt shafts

The *Reports* record the discovery of a considerable number of bolt shafts at Dura, at the Palmyrene Gate (*Rep*. I, 18; II, 72–3), in the Temple of the Palmyrene Gods (*Rep*. II, 72–3) and elsewhere (*Rep*. III, 78–9). The '18 wooden javelins' found in Tower 15 were probably also bolt shafts (*Rep*. IV, 10). The best-known examples are from Tower 19 (*Rep*. VI, 455–6, pl. XXIV:2).

Great difficulty was encountered in trying to equate objects at Yale with museum records, but most were eventually accounted for. There are twenty-six shafts at Yale, plus one transferred by exchange to the Royal Ontario Museum. The archive records that nine were assigned to Damascus Museum, but no details of these are preserved. With the additional pair published by Cumont (1926, 260–1), nearly forty whole or fragmentary shafts are accounted for.

No absolutely complete bolt was found. At least one (**810**), and allegedly another (**830**), were found with socketed bodkins attached, but in the former case the head is now separated and can no longer be certainly identified, while in the latter the association is dubious. In both cases, the vanes were missing.

As with the heads, it was not possible to weigh the shafts, but once again most are broken and all have had their masses significantly altered by desiccation and/or biological attack, so any statistical analysis of weight would be pointless. However, as a general guide, the largely complete but flightless shaft **830** weighs 42.5 g (J. Hayes, pers. comm.). It may well have weighed 50% more when freshly cut because of its water content.

Attachment of heads

Few of the bolts are complete at the fore end. Many preserve little more than the tail and stabilizers. There are no isolated foreparts, presumably because they were far harder to recognize during the excavation, since they lack the characteristic vanes.

Only a handful are well enough preserved to yield definite information on how the iron heads were fitted. **810** (found with a head attached, although this is now lost), **821–823** and **830** were whittled into points for socketed heads. Shafts **821** and **822** show bruising to the wood caused by jamming into a socket, and traces of fastening nails. Others seem to have had socketed heads snapped from them (e.g. **824** and **825**).

At least one was square cut at the front and had had a tanged head driven in (**816**). One of those found by Cumont may have been treated in the same way, although the excavator thought that it had originally had a jointed, two-part shaft (**832**; Cumont 1926, 260–1). All the earlier bolts from other sites mentioned above were definitely of composite construction.

Stabilizers

The shafts were provided with either two or three stabilizers or vanes near the tail. These were made of wood rather than feathers, perhaps because feathers simply were not robust enough to stand up to the strong accelerations experienced at

launch, or to the powerful aerodynamic forces encountered during free flight.

Those with a pair of vanes had them aligned in the horizontal plane. Triple-vane bolts did not exhibit radial symmetry. There was a vertical stabilizer on the dorsal surface, while the other two were in the horizontal plane. This left the entire ventral surface of the projectile free of encumbrance, evidently in order to allow it to sit low in the groove in the slider, helping to hold it straight during launch.

In most cases the vanes were attached by one of two methods, being either fixed in saw-cut grooves or housed in mortises. The simplest had two vanes in the horizontal plane, pushed into sawn grooves (**818–826**, **828–833**). These flights were cut from thin sheets of wood, the grain aligned with a backward sweep, in imitation of the barbs of a feather. The 'wingplan' is also strongly swept, with trailing edges ending in points.

The most complex type had three vanes, housed in deep mortises (**806–812**). The horizontal flights were of a single piece of wood, pushed through a mortise which pierced the shaft from one side to the other. The grain of this piece was perpendicular to the axis of the projectile. The wingplan expanded towards the rear, but was more rounded than that of the simpler type. The vertical stabilizer was in a second mortise cut from the dorsal surface down to the transverse mortise. The vane was of the same outline as the other two and also had perpendicular grain.

There are also intermediate forms. **827** is a bolt with only two vanes, but these are made from a single piece of wood in a mortise, while a three-vane bolt with groove-fixed horizontal stabilizers, and a mortised dorsal, was also identified (**810**).

Manufacture of catapult bolts

Unsurprisingly, there is evidence that bolts were being made at Dura during the siege. Quantities of complete but unattached heads were found in the Palmyrene Gate (*Rep*. II, 7). Lacking attachment holes, they presumably awaited the punching of these in preparation for riveting to wooden shafts. Iron bolt-head **753** appears actually to be two socketed bodkins, one in the socket of the other, perhaps from a store of loose heads. Wooden bolt shaft **805** lacks attachments for stabilizing vanes, and likewise appears to be only partly finished.

Manufacture of heads

Both the tanged and socketed bodkins are extremely simple forgings, easily made from a simple billet of iron. The manufacture by hammering of the pyramidal point and square-sectioned tang are simple enough to envisage. The socket was made by hammering the billet so that it thinned and splayed towards the rear end. It was then simply hammered over into a conical shape. The seam was left open, presumably both for economy of effort and to allow the socket some spring to grip the shaft tightly. As noted above some examples were found without holes for fastening nails, but it may be that nails were sometimes dispensed with, especially in the siege emergency.

Sim has looked at the production of iron projectile heads, specifically including the pyramidal bolt-head, discussing the time, effort, and manpower required to hand-forge such items (1992, 111, fig. 2). There is evidence that such projectile heads were not made from hardened iron, because greater skill was required for no benefit; softer iron could be worked more easily (Sim 1995, 2).

Manufacture of shafts

Production of wooden bolt shafts was a more complex affair. Several different woods were identified, namely ash, birch and pine (*Rep*. VI, 455), tamarisk (Cumont 1926, 260) and maple, the latter used for vanes (*Rep*. VI, 455). Both round wood and billets from larger logs appear to have been employed.

A billet of wood was cut to approximate length, sometimes with a saw (Fig. 127; **827**). This was then carved to approximate shape, with a very sharp knife, drawknife or perhaps chisel. Varying degrees of competence and care are revealed by the surface finish of the pieces, which often show faceting. One at least still retains some bark (**814**).

The basic shape of the shaft is a very elongated cone, expanding from the tip (*c*.12–20 mm in diameter), up to the tall tail edge which sat against the horizontal catapult string at launch. The thicker wood at the tail also accommodated the jointing of the wooden vanes.

While many of the shafts are fragmentary and distorted by post-depositional factors, there does seem to be evidence for deliberate refinements beyond this basic shape. Some longer bolts seem to be slightly waisted, expanding slightly just behind the head (**824** and **825**). Perhaps more generally, the bolts seem to have been shaped so that the lower edge was parallel with the line of flight, presumably so that they left the slider at the correct flight attitude, not slightly nose-down as would have been the case with a symmetrical cone shape (Fig. 127). In support of this, it may be seen in examples such as **832** that the horizontal stabilizers were also apparently mounted parallel to the lower edge of the bolt, not to the central axis of the cone of the shaft. M. Bishop points out that this asymmetric shape may well have acted as a primitive aerofoil, generating some lift (pers. comm.).

The front end was cut square if it was to receive a tanged head, or trimmed to a conical point if intended for a socket. Sometimes the latter operation was very carefully executed (e.g. **823** (?) and **830**), but often it is extremely crude, consisting of the rough whittling of a faceted point (e.g. **816**, **822**, **824** and **825**). This may indicate that the end was sometimes cut as a separate operation, when a particular head was fitted. This would explain the considerable variation in the detailed shape of sockets.

The tail was formed by paring down the sides of the conical rough-out, to leave the flat-sided upright tongue against which the catapult's 'bow-string' would bear. The thickest part of the resulting form, now several centimetres from the rear, would house the vanes. An unfinished bolt at this stage of manufacture was recovered from the site (**805**). The simplest way to affix the horizontal stabilizers was to cut a longitudinal groove in each side with a saw, and wedge the flights in. There is no indication of glue. It is a simple and elegant solution, and evidently effective. The strongly swept vanes were given thinned leading edges, which would help to reduce drag.

The alternative and slower method was to cut mortises, presumably with a thin chisel or knife. A mortise right through the bolt for the one-piece horizontal stabilizer was accompanied by a vertical one for the dorsal fin. The latter was

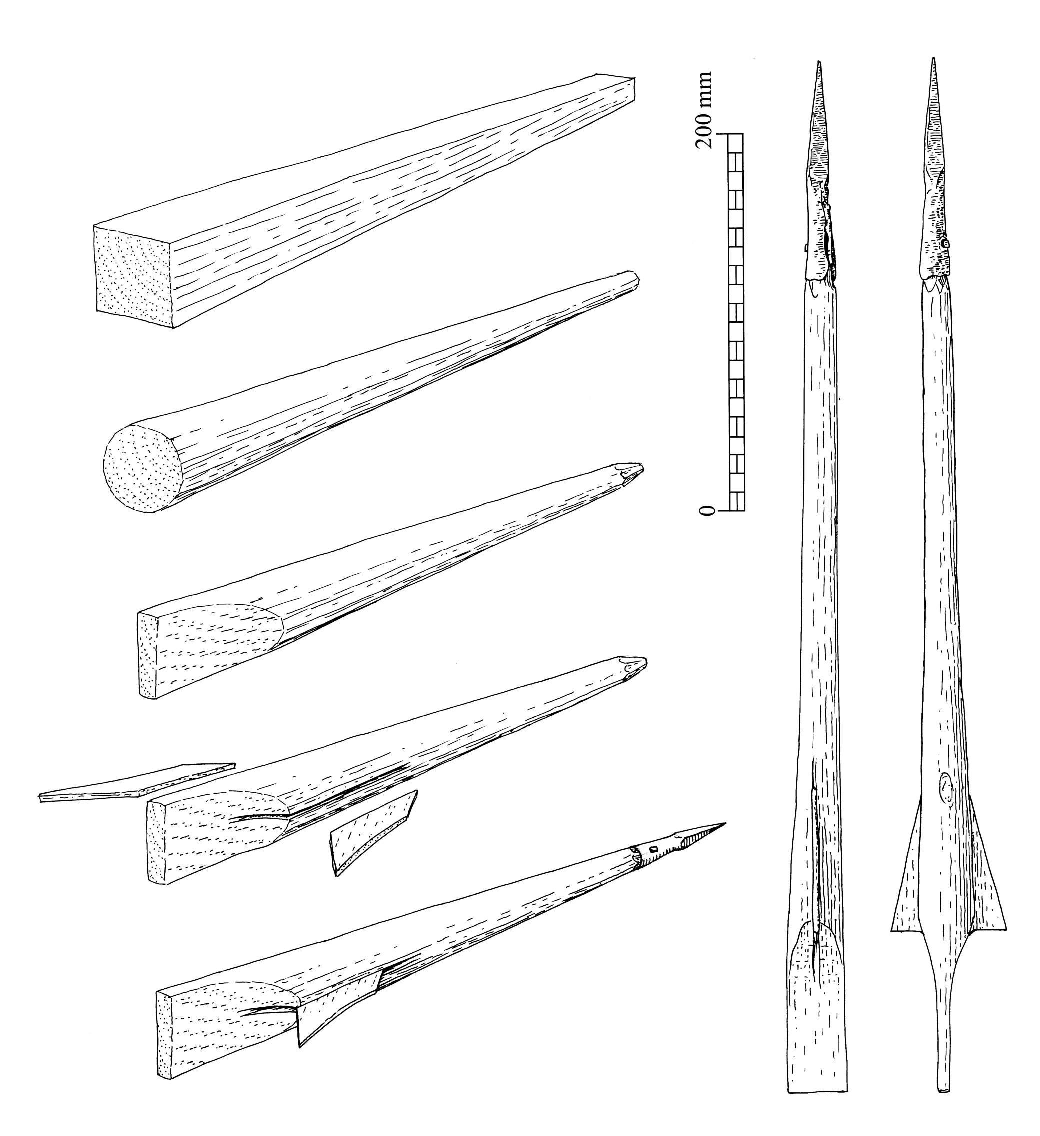


Figure 127 Left, construction of a bolt shaft, from a tapering billet of wood. Right, reconstruction of a typical bolt.

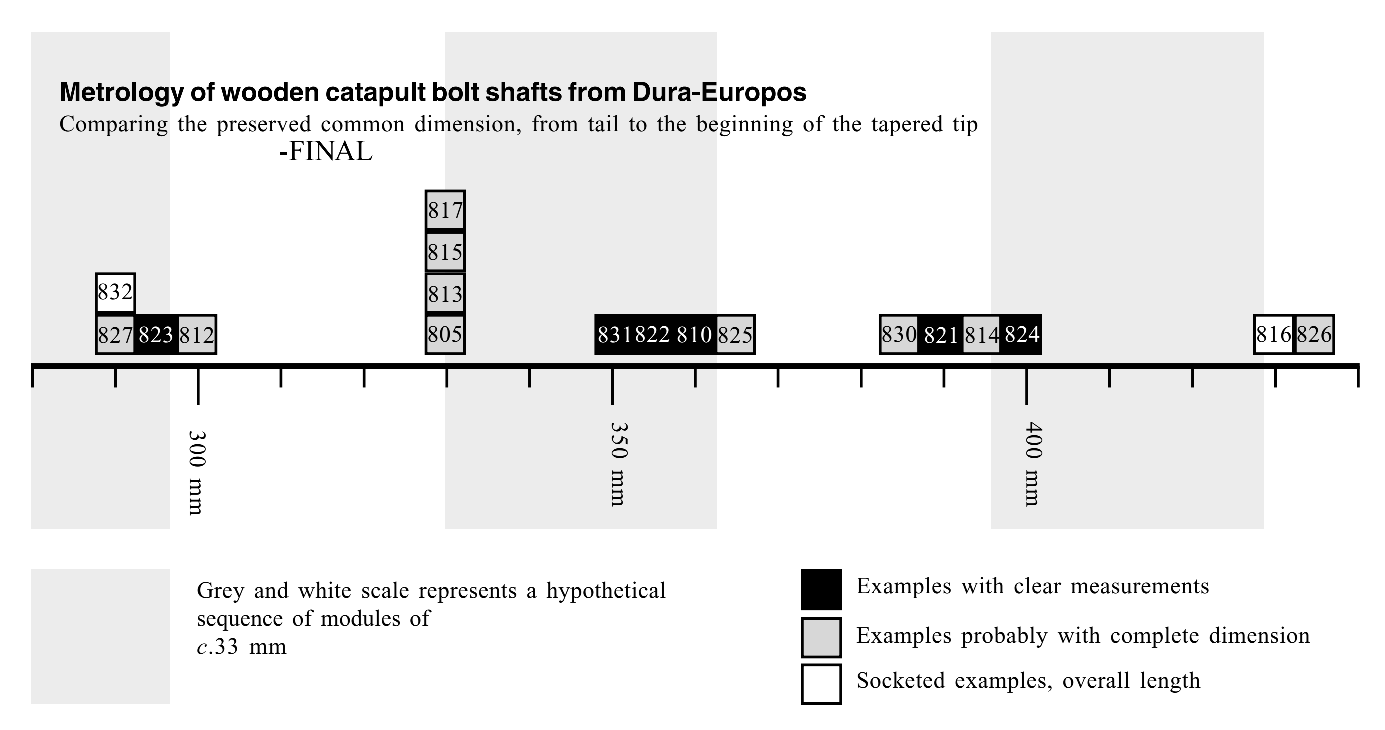


Figure 128 Diagram: size of bolt shafts.

sometimes wedged with extra wood chips because the mortise was too big (**806**). Again, leading and trailing edges of the vanes were carefully thinned.

There is no certain case of any of these shafts being painted (although see **818**).

Metrology of catapult bolts: 'calibres'

It is reasonable to expect that the bolt-shooting machines employed at Dura took standard sizes of ammunition, even though the form of the machines probably used at the city (see below) almost certainly allowed a broad range of sizes to be shot. One factor encouraging this is predictability of fall of shot, a prerequisite for accuracy. While not necessary against massed targets, it was essential to pick off individuals, or to shoot into a small window at long range. To achieve this, it would be necessary to produce bolts to a common standard as accurately as possible, so that they would exhibit the same aerodynamic behaviour and follow a predictable trajectory to the target. Even if, in the context of the siege, the rate of shooting was more important than accuracy, ease of storage and handling would still encourage the employment of standard sizes.

Until the early imperial period it appears that a very common size for bolts, used in Hellenistic artillery experiments, was a length of three spans (about 27 inches, *c*.675 mm: Marsden 1969, 38 – although his source is unclear). Indeed the name 'three-span' became attached to a particular size of standard arrow-shooter (Baatz and Feugére 1981, 208). With early machines the bolt had to be long enough for its tip to project through the small aperture in the catapult spring-frame; this was to remove the danger of the bolt bouncing back off the frame if the machine did not discharge properly (because of such factors as asymmetrically tensioned springs causing the bolt to pull sideways out of the launching groove when the trigger was released), with consequent lethal risk to the crew. The size of the bolt therefore depended on the size of the machine, according to a system of relative proportions recorded by Vitruvius and others (Marsden 1969). However, a new catapult design with a wide frame, which appeared in the early empire, removed the need for this, as tumbling, mis-shot bolts could escape the machine safely through the frame. This allowed the bolt to be much shorter (Baatz and Feugére 1981, 208); indeed the same machine could shoot bolts of different sizes if required. In the early sixth century Procopius describes artillery bolts as half the length of an arrow (i.e. *c*.400–450 mm?), four times wider, with wooden vanes and a long iron point (5.21.16). In general terms, the wooden bolts from Dura correspond well to Procopius's description. However, within the sample, is it possible to discern one or more specific ammunition sizes?

Metrology is a very difficult area, requiring the most rigorous method if anything useful is to be deduced regarding measurements or modules which might have been used in the production of items such as these bolts. We are dealing with analysis of statistical patterns which are only likely to be unequivocal with numerically large samples consisting of more or less complete pieces. The Dura sample of about thirty measurable examples of wooden bolt shafts, although so far unmatched elsewhere in the Roman world, is still too small for firm conclusions to be drawn. In addition, a number of the bolts are highly fragmentary and are therefore of very limited assistance. However, most shafts are either complete or nearly so, so that certain of their original dimensions do appear to be recoverable.

It is interesting that a number of the bolts clearly broke at the same point, namely just about where the shaft begins to be tapered and originally disappeared from view into the split socket of the iron tip (e.g. **810**, **811**, **824** and **825**). Other examples may plausibly be thought to have broken at the same place but are less clear (e.g. **820**, **826** and **827**). Why this should be is not evident. It seems unlikely to be entirely due to accident that so many are broken at this point rather than in the middle of the shaft (as a result of the collapse of the towers, where most were probably found). It appears more likely that the iron heads were deliberately snapped off and the shafts discarded, perhaps during the looting of the city after its fall.

Whatever the reason, it does appear that we have some grounds for directly comparing the size of this group of shafts through the use of their common measurable dimension, from the tip of the tail to the beginning of the tapered nose, which equates roughly with the start of the socket of the iron head (Table 4). The 'tail-to-taper' dimension is actually hard to measure very precisely even in those cases where the knife-facets are clear, as there is no sharp carination where the shaft begins to taper into the point, but a rather gradual change of profile. The figures given are therefore accurate only to the nearest five millimetres. The two intact shafts intended to take tanged heads (**816** and **832**) can also be added in, their overall length arguably being equivalent to the 'tail-to-taper' dimension for other shafts.

If the dimensions are noted against a scale of millimetres, a pattern emerges (Fig. 128). There appear to be several clusters and, I suggest significantly, these are quite regularly spaced. They fall at about 290–300 mm, 330 mm, 350–65 mm, 385–400 mm and 430–35 mm. But do these represent an original deliberate system of ammunition sizes, or are they accidental or some artefact of the way in which the data have been measured?

Firstly, it should be noted that the increments between clusters are far larger than the ±2.5 mm accuracy of most of the measurements, so they are not an artefact of measurement. Nevertheless, it is quite evident that several probable sources of cumulative error lie between these figures and the original intentions and practices of the manufacturers (whatever they may have been). These include inaccurate measurement at manufacture, variable standards of manufacture, plus subsequent mechanical distortion and especially shrinkage due to drying. Could these somehow explain the pattern? However, if there had been strong original patterning in projectile dimensions – a range of distinct 'calibres' – then the cumulative error would tend to blur it, making the surviving pattern measurable today closer to an apparently purely random spread. The fact that clustering at fairly regular intervals still appears to be discernible is evidence that there were indeed deliberate modules, and the intervals provide a rough indication of the original increments between them. However, it must be emphasized that the original intended modules very probably included the length of the iron tip, which cannot be allowed for here with sufficient accuracy to produce precise results. Even if we could add this allowance, with such a small

sample and the other problems such as shrinkage of the wood due to drying, accuracy of original measurement, accuracy of my recording, etc., we cannot deduce exactly what the original modules were (in terms of millimetres or, originally, Greek spans, Roman feet, or some other unit). However, it can at least be suggested that the observed pattern derives from the use of a range of fixed sizes, increasing by increments of a dimension around 33 mm or slightly larger. This does not appear readily to correspond to any obvious known module such as dactyls.

Even if it is accepted that the Dura evidence accurately reflects several specific categories of ammunition of approximately recoverable size, it does not follow that we can conclude that there was an equivalent number of different sizes of arrow-shooting machines in use among the defenders and, perhaps, the attackers. It is quite possible that each machine used several different types of ammunition for different targets or conditions (perhaps the socketed- and tanged-headed types were distinguished for some such reason). The best evidence for this is the incendiary bolt-head (**804**). There is no reason to assume other than that this was a special type of projectile shot when necessary from an otherwise standard machine. However, its greater weight forward may well have required the counterbalancing of a longer shaft than that used for standard ammunition for the same machine.

The possibility of attempting a similar metrological analysis of the iron bolt-heads was considered. However, it seems likely that if there had been any attempt to make bolt-heads according to well-defined modules, the most likely critical dimension would have been the weight of the billet from which each head was worked. These could have been quite easily kept within close confines by cutting measured lengths from iron bars of standard section. Given the difficulties and possible variations in skill of the subsequent forging, it is doubtful whether there would be sufficient patterning in spatial dimensions to detect modules; in other words, bolts made from near-identical amounts of iron could have widely differing lengths and relative proportions of head and socket or tang. A preliminary plot of lengths did indeed show little discernible patterning. Unfortunately the critical measurements of weight could not be made at Yale due to lack of equipment; however, the original weights are no longer measurable in any case, because of physical damage and especially weight changes caused by corrosion, which in some cases is massive. Further, many of the heads contain nails and even fragments of the wooden shaft in the socket, so that the weight of the head alone could not be measured. Consequently it was judged that this avenue of approach would not produce meaningful results, even if weight data could be assembled.

Whatever may be the truth about the metrology of the Dura bolts, the tentative conclusions should only be applied to discoveries elsewhere with great care, as in any case Dura was a city under siege, probably manufacturing and consuming vast quantities of ammunition. The standards of manufacture may therefore have been quite atypical of those applied elsewhere, when there may have been time to sand and shape bolts precisely to an immaculate standard, like the early imperial pieces from Haltern, Vindonissa and Qasr Ibrim (p. 209). These latter may have been the actual norm in the Roman military.

Stone projectiles

Large numbers of carefully shaped stone balls, 60–200 mm in diameter and weighing up to 7 kg, were recovered at Dura, in the citadel and the area of the ramp (Leriche 1993a, 83) and are mentioned in the *Reports*. Only a handful actually survive at Yale, all lacking any archaeological context. Such balls are usually explained as artillery projectiles, although Roman troops are known to have been trained to throw stones by hand; a technique which could be very effective, especially in the conditions of a siege (Baatz 1966). However, whether it was necessary for hand-thrown stones to be so carefully finished is doubtful, and in the case of well-formed stone spheres an identification as artillery ammunition seems preferable.

Some thirty-five balls said to weigh 6–7 kg were found in the second season in the upper citadel and around the Palmyrene Gate (*Rep*. II, 14), while others 120 to 150 mm in diameter and weighing ‘several pounds’ were recovered ‘close to the palace on the west side’ (*Rep*. II, 55). It seems likely that, given the considerable size and reasonable standardization of these stones, they should be regarded as projectiles for artillery. More were found around Tower 14 and the Tower 15 ramp (presumably shot by the defenders, *Rep*. IV, 10) and ‘a number of stone balls of two different sizes used by the slingers [*sic*]’ was recovered from within Tower 16 (*Rep*. IV, 11). Further examples were discovered in the defences at the Temple of Aphlad (*Rep*. V, 101). Three balls of gypsum were found in House E4 (*Rep*. VI, 28).

There is no sign at Dura of any systematic recording of the weights or other details of these projectiles, which, except for the unrepresentative handful catalogued here (**843–851**), do not appear to have been preserved. Little useful can be said on such scanty data, beyond the unsurprising fact that stone-throwers appear to have been used during the siege. However, recently a major new find of artillery projectiles has been made at Dura, which may provide much more information on the calibres in use (James forthcoming; see Holley 1994 for analysis of such ammunition from Masada).

Artillery at Dura

It is clear that a variety of machines were used at Dura, at least by the defenders, including probably at least two sizes of arrow-shooter (given the great disparity in sizes between, for example, bolts **823** and **826**). It is likely that the attackers, too, made extensive use of artillery. It was argued above (p. 16) that the Sasanians, if they lacked expertise of their own, co-opted that of subject peoples. In the fourth century, the Sasanians demonstrated that they were willing and able to employ captured Roman artillery (and perhaps crews) in sieges (e.g. in the fourth century at Amida the Persians used artillery captured at Singara: Ammianus 19.2.7; 5.1; 7.4).

The historical context of the siege of Dura makes it entirely possible that catapults captured at other centres during the recent wars could have been used by the Persians. However, the possibility that there was some local capability in the manufacture and use of artillery in at least some parts

of the Sasanian empire should not be ruled out. The quasi-independent Mesopotamian city of Hatra showed particular skill in its use during the Severan period (Cassius Dio 76.11.2) and a machine has been found there (Baatz 1978). Given this, it is possible that some of the bolt shafts are of Sasanian or at least Persian allied origin. A century after the siege of Dura, Julian, besieging the Persian city of Bersabora in Mesopotamia, apparently found it defended by machines (Zosimus 3.18).

Nevertheless, it remains impossible to assign individual pieces to attackers or defenders. All the bolt-head types can be shown to have been used by Rome in Europe, but most also appear on Persian sites. The bolt shafts are virtually unparalleled anywhere, making it hard to assess their significance. It is possible, for instance, that the three-vaned mortised shafts are Persian and that the two-vaned grooved shafts are the Roman type, but there are too many other possibilities for this to be suggested seriously. For example, the differences could be linked with the types of machine employed or, more likely, with the type of head and the length of the bolt shaft. Length, and the form and mass of the head, would affect the amount of stabilizing surface needed at the tail to ensure true flight. For example, the relatively nose-heavy, high-drag incendiary head would require more stabilization than a slim bodkin.

Other factors, peculiar to the circumstances of the siege, may well impinge, militating against generalization about Roman catapult bolts on the basis of the Dura evidence. The high rates of ammunition use which are to be expected in the prolonged and intensive fighting during the siege may well have led to cutting of corners, and the employment of production methods not normally used. So, for instance, regular peacetime stocks may have consisted of the relatively elaborate mortised three-vane shafts, made at leisure as a routine duty. Mass production to replenish stocks during the siege could be responsible for the appearance of the simple, sometimes crude, bolts with only two vanes. Fastening the flights in saw-cuts would be far quicker than cutting the mortises seen on some examples. It is noteworthy that the Augustan bolts from Haltern were extremely carefully finished, with complex, accurately made joints (Dahm 1903; Schramm 1905; see also evidence from Vindonissa: Simonett 1942, 15, and now Qasr Ibrim: James and Taylor 1994).

Little can be said about the types of machines employed, except that the archaeological evidence is compatible with the expected range of light and heavy arrow-shooters, and stone-throwing artillery. It would be particularly interesting to know whether the single-armed *onager* had been introduced. It was standard in the fourth century (Ammianus 20.7.9; 23.4), but at Hatra, destroyed less than twenty years before Dura, two-armed stone-throwers were still used (Baatz 1978), showing that the new type, if already in use, was not universal.

The bolts give only the barest idea of the scale of the machines that shot them, as developments in catapult design which took place early in the imperial period meant that bolt length was no longer connected to machine size by precise formulae – or at least, not the established Hellenistic formulae (Baatz and Feugére 1981, 208). The distinctive characteristic of the later arrow-shooters is a wide frame, placing the springs far apart, giving the gunner a good field of view and reducing the danger of mis-shot bolts ricocheting off the frame (D. Baatz, pers. comm.). The possibility that these late, iron-framed machines had arms which swung inwards, between the frames rather than outwards, has been discounted by Baatz but, in my opinion, remains an attractive possibility. Such machines would be useful in confined spaces, such as on walls or in towers. Catapults could be as dangerous to their crews as to the enemy; Ammianus records an accident with an *onager* (Ammianus 24.4.28). The in-swinging design would considerably reduce such risks.

Most of the Dura shafts represent bolts about 0.5 m long, from medium or light arrow-shooters, which were small enough to be easily moved, if not wielded by one man like a crossbow: hence their name, *manuballistae*. A dramatic eyewitness account of their portability and firepower is given by Ammianus. During the siege of Amida a tower captured by Persian bowmen was swept clear by five light arrow-shooters, which decimated the bowmen, sometimes killing two with one bolt (Ammianus 19.5.5).

The unusual leaf-shaped bolt-heads strongly resemble medieval crossbow projectiles. This may not be coincidental. It is entirely possible that conventional crossbows, drawing their power from a stiff, conventional bow rather than torsion springs, were in use at Dura. Such weapons were known in antiquity: torsion artillery itself developed from heavy crossbows such as the *gastraphetes* (Marsden 1971, 97, diagram 5). Certainly crossbows are clearly depicted in third-century reliefs from Gaul (Espérendieu 1908, nos 1679 and 1683; Coulston 1985, 259–63; Baatz 1994b, 284–93). Components from such machines, namely the characteristically shaped trigger nuts, have tentatively been identified from Roman sites (at Carnuntum, *RLÖ* X, 63, fig. 22:5; MacGregor 1976). Baatz has suggested that in early imperial times they were hunting weapons not put to military use, but his grounds are unclear (1966, nn. 56, 62; 1991). However, in later Roman times crossbows certainly were used for military purposes (Baatz 1999, 14–15; Vegetius 2.15, 4.22). Perhaps they were already being reintroduced into warfare during the third century.

Another intriguing possibility is that military interest in the crossbow may have been reawakened in early imperial times as a result of indirect contacts with Han China, where the crossbow was highly developed (Horwitz 1917). The Chinese eventually developed exotic weapons such as the repeating crossbow, with a lever mechanism and gravity-fed magazine on top of the slider (Horwitz 1917, 174–6, figs 32–9). Repeating catapults using the same principle were known in Hellenistic times (Marsden 1969, 75), so it is possible that such weapons were employed at Dura. Certainly the Hatrenes are reputed to have had machines which shot two bolts at once (Dio 76.11.2). It is interesting to note that the bolts with only two vanes might have been suitable for a gravity-fed repeating catapult or crossbow.

Catalogue: Catapult ammunition

Iron bolt-heads

Socketed iron bodkins of square section

742

Socketed iron bodkin
Provenance: Tower 19*
Yale no. 1938.5999.1043
Dura no. unknown
Length 110 mm, socket diameter 15 mm
* Identifiable in *Rep*. VI, pl. XXIV, 'Finds from Tower 19' (bottom row, third from left).

Perfect except for some localized corrosion pitting. In part the iron is still shiny. It has the split socket standard on this type. The square-shanked fastening nail is 17 mm long.

There are many parallels for this simple form. Early examples may be seen at Epirus (Baatz 1982, 229–31, fig. 7, pl. 45:2). They are found across the entire empire, e.g. at Caerleon (Nash-Williams 1932, 70–1; fig. 17); Cirencester (Webster 1958, 75, no. 38, fig. 3); Newstead (Curle 1911, 188–9, pl. XXXVII:14, 16–21); Vindonissa (Unz and Deschler-Erb 1997, nos 459–92); Buciumi, Romania (Chirila *et al*. 1972, pls LX, LXI); Gamla, Israel (Gutman 1981, 34).

743

Socketed iron bodkin
Provenance: Tower 19 (?)*
Yale no. 1938.5999.1048
Dura no. F???? (illegible)
Length 104 mm+, socket diameter 16 mm
*Probably to be identified with a bolt-head in *Rep*. VI, pl. XXIV, upper row, second from right.

The tip is corroded. The fastening nail is intact.

744

Socketed iron bodkin
Provenance: Tower 19
Yale no. 1933.688 (part of)
Dura no. F973
Length 107 mm+, socket diameter 17 mm

The tip is corroded. Square-shanked fastening nail *in situ*.

745

Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1119
Dura no. unknown
Length 130 mm, socket diameter 16 mm

In virtually perfect condition. The socket still contains part of the wooden shaft.

746

Socketed iron bodkin
Provenance: Tower 19
Yale no. 1933.688a.1
Dura no. F1195
Length 129 mm, socket diameter *c*.10 mm
Published in *Rep*. VI, pl. XXIV (top row, fourth from right)

Tip of shaft still in socket. In good condition.

747

Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1053
Dura no. unknown
Length 126 mm, socket diameter 16 mm

Extensively encrusted.

748

Socketed iron bodkin
Provenance: Tower 19 (?)*
Yale no. 1933.688.7
Dura no. F1360 (?)*
Length 112 mm, socket diameter 16 mm
* Site register gives 'F1360 . . . Tower 19, 2 coins, fragments of mail'.

749

Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1049
Dura no. unknown
Length 113 mm, socket diameter 16 mm

From the state of the tip, this appears to have been shot from a machine.

750

Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1050
Dura no. unknown
Length 124 mm, socket diameter over 10 mm

Heavily oxidized. The grain of the shaft is preserved in the corrosion products. Its peculiar cruciform section is the result of internal expansion of oxidation products forcing the four faces apart.

751

Socketed iron bodkin
Provenance: Tower 19
Yale no. 1933.688.3
Dura no. F933 (part of)
Length 104 mm, socket diameter 16 mm
Probably to be seen in *Rep*. VI, pl. XXIV (bottom row, third from right)

The nail hole is empty.

752

Socketed iron bodkin (Figs 129 and 138)
Provenance: Tower 19
Yale no. 1933.688.4
Dura no. F993 (part of)
Length 98 mm, socket diameter 14 mm

The nail hole is square.

753

Socketed iron bodkin(s)
Provenance unknown
Yale no. 1930.620a
Dura no. unknown
Length 142 mm

This strange and badly corroded object appears to be a pair of loose heads, one inside the other, fused by oxidation. This implies that they were not shafted at deposition, but were perhaps unfinished.

754

Socketed iron bodkin
Provenance: Tower 19 (?)*
Yale no. 1933.688.8
Dura no. F1970
Length 110 mm+, socket diameter 16 mm
* Identifiable in *Rep*. VI, pl. XXIV (top row, third from right). The site catalogue gives 'F993; Tower 19 spearheads. 1933.688'.

The tip is heavily corroded.

755

Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1039
Dura no. unknown
Length 111 mm, socket diameter 14 mm

756

Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1042
Dura no. unknown
Length 98 mm, socket diameter 15 mm

The socket, which is corroded, contains an empty nail hole. The tip is still shiny.

757

Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1040
Dura no. unknown
Length 94 mm, socket diameter 19 mm*
* The socket may not have been properly closed if, as seems likely from the empty nail hole, this head was never attached to a shaft.

758

Socketed iron bodkin
Provenance unknown
Yale no. 1930.619b
Dura no. unknown
Length 106 mm, socket diameter *c*.12 mm

The socket is damaged. Square-shanked fastening nail.

759

Socketed iron bodkin
Provenance: Tower 19
Yale no. 1933.688.5
Dura no. F993 (part of)
Length 111 mm, socket diameter 13 mm

Thick layers of concretion, largely flaked off. The nail hole is empty, but the socket retains powdery traces of the shaft.

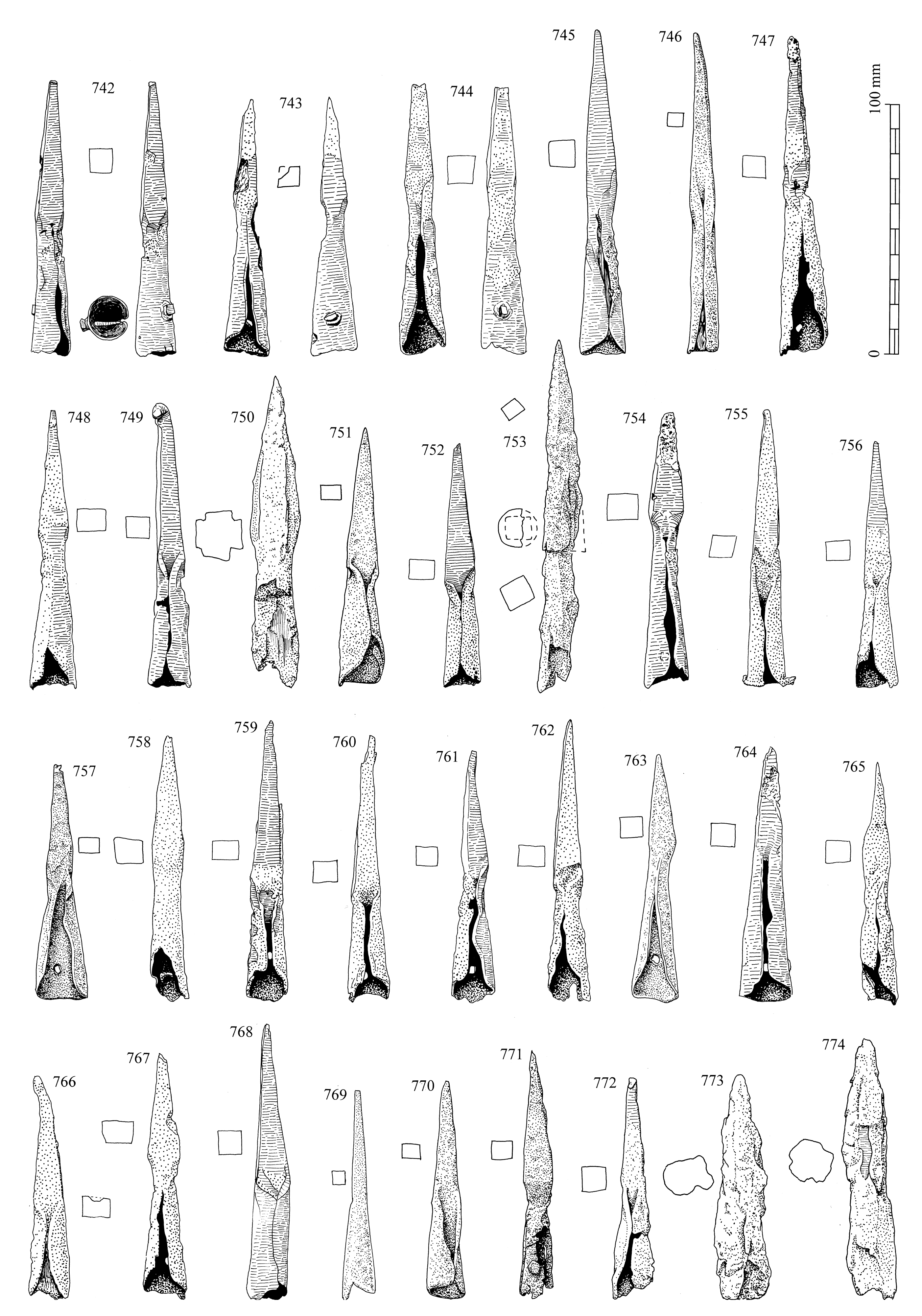


Figure 129 Catapult ammunition (iron): socketed bodkins **742** to **774**.

760
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1045
Dura no. unknown
Length 106 mm, socket diameter 15 mm

The nail hole is empty. This may have been shot.

761
Socketed iron bodkin
Provenance: Tower 19*
Yale no. 1938.5999.1044
Dura no. F1049 (part of)*
Length 100 mm, socket diameter 15 mm
* Found with **770**. Site register gives 'F1049a–c; Tower 19, 2 lance-heads, 1 coin'.

The square nail hole is empty.

762
Socketed iron bodkin
Provenance unknown
Yale no. 1932.1721
Dura no. unknown
Length 112 mm, socket diameter 15 mm

The nail hole has apparently been torn through.

763
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.2851
Dura no. unknown
Length 99 mm, socket diameter 17 mm

The nail hole is empty.

764
Socketed iron bodkin
Provenance: Tower 19
Yale no. 1938.5999.1054
Dura no. F973
Length 101 mm, socket diameter 20 mm
Identifiable in *Rep*. VI, pl. XXIV (bottom row, centre)

The nail hole is empty. The socket is larger than normal, and the object is not waisted. Possibly a spear ferrule.

765
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1046
Dura no. unknown
Length 97 mm, socket diameter *c*.14 mm

766
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1052
Dura no. unknown
Length 90 mm, socket diameter *c*.14 mm

The socket contains traces of wood grain from the shaft in the oxides. Distortion of the tip may indicate that it has been shot. Unusually, it is not waisted.

767
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1051
Dura no. illegible
Length 99 mm, socket diameter 15 mm

The nail hole is empty.

768
Socketed iron bodkin
Provenance: Tower 19
Yale no. 1933.688.6
Dura no. F719
Length 110 mm, socket diameter 14 mm
Identifiable in *Rep*. VI, pl. XXIV (top row, fourth from left)

Unusually, this example is not waisted.

769
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.49
Dura no. unknown
Length 84 mm, socket diameter *c*.11 mm

It is unusually small, but is probably still too heavy to be an arrowhead.

770
Socketed iron bodkin
Provenance: Tower 19
Yale no. 1933.688.2
Dura no. F1049 (part of)*
Length 88 mm, socket diameter 13 mm
* Found with **761**. See **742** for parallels.

771
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1038
Dura no. F1979 (?)*
Length 99 mm+, socket diameter *c*.13 mm
* Number not very legible. Does not correspond to site register.

The socket is partly corroded away, but the nail is intact.

772
Socketed iron bodkin
Provenance: Tower 19
Yale no. 1933.688.10
Dura no. F1648
Length 88 mm, socket diameter 14 mm

See **742** for parallels.

773
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1058
Dura no. unknown
Length 90 mm

Covered in a very thick layer of concretion.

774
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1056
Dura no. unknown
Length 105 mm

Covered in a very thick layer of concretion. Section originally square.

775
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1057
Dura no. unknown
Length 103 mm

Covered in a thick layer of concretion.

776
Socketed iron bodkin
Provenance: Tower 19
Yale no. 1933.688.9
Dura no. F2115
Length 120 mm, socket diameter 18 mm

The nail is broken. Either a heavy bolt, or a spear ferrule.

777
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.313
Dura no. unknown
Length 122 mm, socket diameter 12 mm+

Either a heavy bolt or a spear ferrule.

778
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1055
Dura no. unknown
Length 133 mm, socket diameter 16–18 mm

Heavily encrusted. The exterior oxidation products preserve the grain where wood has been in contact during burial. Either a heavy bolt or a spear ferrule.

779
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1047
Dura no. unknown
Length 129 mm, socket diameter *c*.15 mm

The long point is of subsquare section. Possibly a spear ferrule.

780
Socketed iron bodkin
Provenance: Tower 19 (?)*
Yale no. 1938.5999.52
Dura no. unknown
Length 117 mm, socket diameter 15 mm
* Possibly to be identified with a bolt-head in *Rep*. VI, pl. XXIV (bottom row, fourth from right)

The long point is of circular section. The nail hole is empty. Possibly a spear ferrule.

781
Socketed iron bodkin
Provenance unknown
Yale no. 1938.5999.1041
Dura no. unknown
Length 118 mm, socket diameter 14 mm

The long head is of circular section. The nail hole is empty. Possibly a spear ferrule.

782
Socketed iron bodkin
Provenance unknown.
Royal Ontario Museum no. 933.25.27 (part of)*
Dura no. unknown.
Length 122 mm, socket diameter 18 mm
Weight 57.4 g
* Along with bolt shaft **830**, with which it was allegedly associated (although this is highly dubious: see **830** for discussion), this was probably originally Yale no. 1931.590i, but was long ago transferred to the Royal Ontario Museum (information kindly supplied by Dr J. Hayes, supplemented by my own inspection).

The following description was kindly supplied by Dr J. Hayes:

> Wrought iron . . . Solid head, with a hollow expanding socket attached. Head four-sided, of elongated pyramidal shape. Socket rather longer than head, forming a slender neck at junction, expanding conically to open end. Socket formed of a broad strip of iron, bent round in a circle, with an open seam (widening towards end) along one side. A nail (?) with flattened head hammered through socket close to open end (blunted or twisted on inside); a possible second nail hole to the side of it . . . Head cleaned, somewhat corroded, with some losses and holes at end of socket . . . solid head *c*.11 mm square in section. Weight of head 57.4 g.

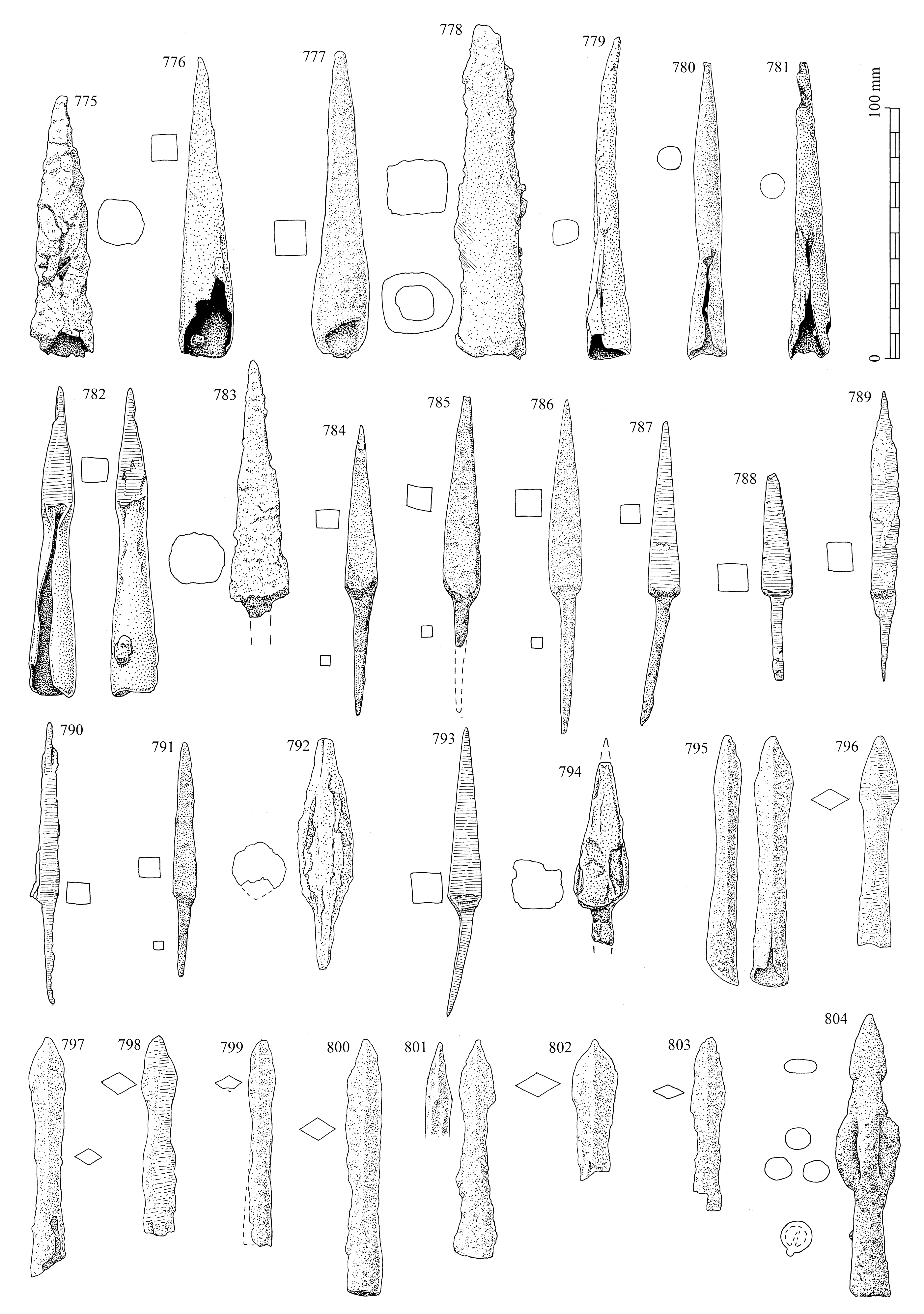


Figure 130 Catapult ammunition (iron): socketed bodkins **775** to **782**, tanged bodkins **783** to **794**, socketed leaf-shapes **795** to **803** and an incendiary head **804**.

Tanged bodkins of square section

783
Tanged iron bodkin
Provenance unknown
Yale no. 1938.5999.1060
Dura no. unknown
Length 102 mm+, maximum width of head 22 mm

The tang is lost. Presumably from an unusually large bolt.

A type common across the Roman empire, e.g. at Caerleon (Nash-Williams 1932, 71 figs 20–1); Newstead (Curle 1911, 189, pl. XXXVIII:9–11); Vindonissa (Unz and Deschler-Erb 1997, nos 421–8). Examples are also known in Iran, at Bastam (Kleiss 1972, 52, fig. 49:3–5, 8, 10–11), and Egypt (Qasr Ibrim: James and Taylor 1994, 94–5, figs 1–2).

784
Tanged iron bodkin
Provenance unknown
Yale no. 1934.442a
Dura no. unknown
Length 116 mm, maximum width 13 mm

Complete.

785
Tanged iron bodkin
Provenance unknown
Yale no. 1934.442b
Dura no. unknown
Length 99 mm+, maximum width 13 mm

The tang is broken.

786
Tanged iron bodkin
Provenance unknown
Yale no. 1938.5999.50
Dura no. unknown
Length 133 mm, maximum width 13 mm

787
Tanged iron bodkin
Provenance unknown
Yale no. 1938.5999.1036
Dura no. unknown
Length 121 mm, maximum width 13 mm

788
Tanged iron bodkin
Provenance unknown
Yale no. 1930.619a
Dura no. unknown
Length 82 mm+, maximum width 13 mm

Both ends truncated by corrosion.

789
Tanged iron bodkin
Provenance: 'J7; Infill against wall B'*
Yale no. 1933.692
Dura no. F92
Length 116 mm+, maximum width 10 mm+
* Information from a site card preserved at Yale.

The surface of this has laminated and is now largely flaked off, which has probably severely distorted its outline.

790
Tanged iron bodkin
Provenance unknown
Yale no. 1938.5999.1059
Dura no. unknown
Length 112 mm, maximum width 7 mm+

The heavily corroded surface has largely flaked away. It was originally considerably thicker.

791
Tanged iron bodkin
Provenance unknown
Yale no. 1938.5999.1035
Dura no. unknown
Length 95 mm, maximum width 10 mm

792
Tanged iron bodkin
Provenance unknown
Yale no. 1938.5999.1061
Dura no. unknown
Length 93 mm, maximum width 22 mm

Completely oxidized and split apart by corrosion, it is distorted almost beyond recognition.

793
Tanged iron bodkin
Provenance unknown
Royal Ontario Museum no. 933.25.28
Dura no. unknown
Length 114 mm, maximum width 12 mm
Weight 42.1 g

Complete, square-sectioned bodkin. The tang is slightly bent. (Information kindly supplied by Dr J. Hayes, supplemented by my own inspection.)

794
Tanged iron bodkin
Provenance unknown
Royal Ontario Museum no. 933.25.30
Dura no. unknown
Length 73 mm+, maximum width 20 mm*
Weight 36.4 g
* Very heavily corroded and fissured, resulting in considerable distortion of shape.

The tang is broken. (Information kindly supplied by Dr J. Hayes, supplemented by my own inspection.)

Leaf-shaped heads

795
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1938.5999.1130
Dura no. unknown
Length 100 mm, socket diameter 12 mm

The socket was left split. There is no sign of a fastening nail.

A type not often recognized, but actually paralleled at a number of sites across the empire, e.g. Saalburg (Jacobi 1897, 492, fig. 77:38, 40, pl. XXXIX:17, 19); Carnuntum (*RLÖ* V, fig. 33:4, *RLÖ* VII, fig. 33:1–2; *RLÖ* IX, 35, fig. 10:2); Lauriacum (*RLÖ* X, 94, fig. 36:5); Kastell Ulmus (*RLÖ* VI, 53, fig. 27:1–2) and Vindolanda (Jackson 1985, 136, fig. 49:34).

796
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1938.5999.1131
Dura no. unknown
Length 83 mm, socket diameter 11 mm

797
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1938.5999.1132
Dura no. unknown
Length 95 mm, socket diameter 12 mm

The hole in the socket may be a nail hole, torn through.

798
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1938.5999.1133
Dura no. unknown
Length 80 mm, socket diameter 10 mm

799
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1933.690a
Dura no. unknown
Length 83 mm, socket diameter 10 mm

800
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1938.5999.57
Dura no. unknown
Length 103 mm, socket diameter 11 mm

801
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1938.5999.1134
Dura no. unknown
Length 87 mm, socket diameter *c.*12 mm

802
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1938.5999.1135
Dura no. unknown
Length 55 mm+

The socket is lost.

803
Leaf-shaped iron bolt-head
Provenance unknown
Yale no. 1938.5999.53
Dura no. unknown
Length 69 mm+

Special incendiary ammunition

804
Iron head from an incendiary bolt
Provenance unknown
Yale no. 1938.5999.1033*
Dura no. unknown
Length 113 mm, socket diameter 14 mm
Published in James 1983
* Replacing the previously published no. 1981.62.31.

It is clearly the head of a shafted weapon, with a socket and a small, flattish blade, *c.*27 mm long. There is a fastening nail 24 mm from the edge of the socket. The blade, like the rest of the object, is extensively oxidized, but was certainly two-edged and probably had a lenticular section.

Connecting the blade to the socket are three curved bars, *c.*30 mm long and *c.*8–9 mm thick, of roughly circular section. They were not placed with exact radial symmetry about the axis; two were splayed out slightly, towards the plane of the blade.

Two incendiary heads of closely similar form are known from Šmihel in Slovenia. Neither was a provenanced find, but a late Roman date is likely for these pieces (J. Horvat, pers. comm.). One bolt remains in the collection of the National Museum of Slovenia (inv. P4811; Guštin 1979, pl. 85:4), but the second is lost (Windischgrätz 1892, (7), fig. 8). The surviving example exhibits the same asymmetry of the

central ‘cage’ as **804**. However, it is considerably larger and the tip is pyramidal.

Another example also survives in Slovenia. Found at Ptuj (Poetovio), it is dated to the second half of the fourth or early fifth century AD (Pokranjinski muzej Ptuj, inv. 3010; Curk 1975, pl. 31:29; J. Horvat, pers. comm.).

For documentary evidence on such weapons, and archaeological evidence for incendiary arrowheads, see Brok 1978 and James 1983.

Wooden bolt shafts

805

Unfinished wooden bolt shaft
Provenance unknown
Yale no. 1929.434a
Dura no. unknown
Length 337 mm+

An apparently unfinished shaft, as it lacks grooves or mortises for wooden flights. Fore end broken. Wood identified as pine (*Pinus*) on file card at Yale. The shaft is slightly faceted from the knife (?) used to shape it.

No close parallels are yet known from the Roman empire. There are a number of foreshafts from bolts of composite construction known from early imperial contexts at Haltern (Dahm 1903, Schramm 1905) and Vindonissa (Simonett 1942), and a closely similar piece from Qasr Ibrim in Egypt (James and Taylor 1994, 95, figs 3–4). However, all these pieces are very different in construction from the Dura examples.

806

Broken wooden bolt shaft with three vanes (Figs 131 and 138)
Provenance unknown
Yale no. 1929.434b
Dura no. unknown
Length 277 mm+
Published, sketchily, in *Rep*. II, 72, pl. IX (left)

Made of ash (*Fraxinus excelsior*). Shows various traces of the manufacturing process. The dorsal surface bears saw-marks, from the cutting of the original rectangular billet. The surface of the main part of the shaft is faceted from the shaping knife or chisel. The tail faces bear chisel- or knife-marks.

There are three flights, or vanes. The two horizontal stabilizers are made of a single piece of wood, slotted through a mortise. The grain is at right angles to the main axis. The ‘wingplan’ is slightly rounded, with tapered edges. The vertical stabilizer is also in a mortise. It is damaged, making its outline uncertain. It is held in place with a thin wooden wedge.

The front part of the shaft is broken and charred, with worm-holes.

807

Broken wooden bolt shaft with three vanes
Provenance unknown
Yale no. 1933.446a
Dura no. unknown
Length 317 mm+

Structurally similar to **806**. It also has saw-marks on the dorsal surface, and whittling facets. The flights are arranged and fixed in the same way as **806**, but are longer and lower.

808

Broken wooden bolt shaft originally with three vanes
Provenance: ‘Tour 18’*
Yale no. 1935.89
Dura no. G1628
Length 263 mm+
* The object is labelled thus.

The vanes are arranged similarly to those of **806**. The horizontal stabilizers are in one piece, with a triangular ‘wingplan’. The vertical stabilizer is lost from its housing, because the shaft has split along the grain, across the mortise.

809

Fragment from a wooden bolt shaft originally with three vanes
Provenance: ‘Corner. N801’*
Yale no. 1934.502b
Dura no. G1854*
Length 161 mm+
* Details from a site card preserved at Yale.

This fragment comprises the upper part of the tail of a bolt similar to **806**. Part of the horizontal mortise survives. The vertical vane remains in its slot.

810

Complete wooden bolt shaft originally with three vanes (Figs 132 and 138)
Provenance: Tower 19*
Yale no. 1938.5999.1137
Dura no. unknown
Length 373 mm
* Described in *Rep*. VI, 455, pl. XXIV:2.

Made of ash (*Fraxinus orientalis*), with vanes of maple (species uncertain) (*Rep*. VI, 455).

This shaft was found with an iron head attached. The head was a socketed bodkin, but it has since become detached, and cannot now be identified. The overall length including the head was not recorded. The forward end is faceted by rough whittling. The shaft is gently faceted.

The vertical stabilizer is housed in a mortise, apparently wedged with a wooden fillet. It was cut so that the grain was ‘swept back’ like the barbs of a feather. Both of the horizontal stabilizers are missing. They were housed in saw-cut (?) grooves, in the widest part of the shaft. Unlike **806** etc., the two horizontal stabilizers were separate pieces.

811

Almost complete wooden bolt shaft originally with three vanes
Provenance unknown
Yale no. 1938.5999.1062
Dura no. G1798
Length 371 mm+

The rear end of the shaft is burnt. It is strongly faceted from the basic shaping.

All three flights were housed in mortises. The vertical stabilizer is lost, while both the horizontal ones are broken. The latter were separate pieces, arranged with ‘swept back’ grain.

812

Broken wooden bolt shaft originally with three vanes (Figs 132 and 138)
Provenance unknown
Yale no. 1929.434g
Dura no. unknown
Length 304 mm+
Published *Rep*. II, 72, pl. IX (right)

The front end is broken, and there is extensive insect damage. The three flights were mounted in mortises. The left horizontal vane is lost due to insect attack. The two surviving vanes are intact, and ‘swept back’.

813

Broken wooden bolt shaft originally with three vanes
Provenance unknown
Yale no. 1931.590a
Dura no. unknown
Length 335 mm+

Heavily worm eaten. The upper vane was in a mortise and is now broken. The horizontal stabilizers were housed in grooves, but are now both lost.

814

Broken wooden bolt shaft originally with three vanes
Provenance unknown
Yale no. 1931.590b
Dura no. unknown
Length 403 mm+

A fairly large and heavy bolt, of birch (*Fagus* sp.; probably identified by Prof. Record, *Rep*. VI, 455). A patch of bark remains. Faceted. The fore end is broken, and seems to bear a modern saw-cut, perhaps associated with earlier wood identification. The three flights were housed in mortises, and are now all lost.

815

Broken wooden bolt shaft originally with two vanes
Provenance: Palmyrene Gate, south tower*
Yale no. 1929.434d
Dura no. unknown
Length 334 mm+
* From a labelled site sketch at Yale. This corresponds in size to one of two bolts mentioned in *Rep*. I, 18.

Heavily insect damaged. The two stabilizers were housed in mortises. Only one survives, and is strongly swept, with sharp leading edges.

816

Damaged wooden bolt shaft originally with two or three vanes
Provenance unknown
Yale no. 1933.446c
Dura no. unknown
Length 431 mm

Ash wood (*Fraxinus orientalis*; probably identified by Prof. Record, *Rep*. VI, 455). Shaft complete in length, but the upper rear part is split away. Consequently, it is not certain whether there were two or three vanes. The horizontal vanes were housed in a single transverse mortise.

The fore end of the shaft is socketed, having had a tang driven into it; the wood has split as a result.

817

Broken wooden bolt shaft originally with two (?) vanes
Provenance unknown
Yale no. 1931.590g
Dura no. unknown
Length 331 mm+

Faceted, and badly cracked, probably due to severe heating. It is also split at the tail end, making it uncertain whether there were two or three flights. The horizontal stabilizers were housed in a transverse mortise.

818

Broken wooden bolt shaft with two vanes
Provenance unknown
Yale no. 1929.434e
Dura no. unknown
Length 243 mm+
Published *Rep*. II, 72, pl. IX

A shaft truncated by insect action. The shaft is faceted. The two flights are in slots, and have a delta 'wingplan'. Saw-cuts at the rear of the right vane show the flights were trimmed after fitting. Red material on the upper surface of the flights may be bark, perhaps painted; it is peeling away from the wood.

819

Broken wooden bolt shaft with two vanes
Provenance unknown
Yale no. 1938.5999.1118
Dura no. unknown
Length 269 mm+

The vanes are housed in mortises. They are strongly swept.

820

Damaged wooden bolt shaft with two vanes
Provenance unknown
Yale no. 1931.590h
Dura no. unknown
Length 358 mm+

Severely damaged by biological action, especially at the tail. The two strongly-swept, mortised flights are now largely eaten away.

821

Complete wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1933.446b
Dura no. unknown
Length 458 mm

The shaft is complete except for the loss of the two vanes. These were originally housed in saw-cut (?) slots. The fore end is whittled into a faceted cone, which has been inserted into a socketed head; the wood is bruised by the tight edge of the socket, and impressed by a fastening nail. Whether the head was removed in antiquity or since discovery is unknown.

822

Complete wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1931.590d
Dura no. unknown
Length 382 mm

The shaft is complete except for the loss of the two vanes. These were originally housed in saw-cut (?) grooves. Like **820**, this has had a socketed head attached. The wood is bruised from the edge of the socket, and split by the driving in of a fastening nail.

823

Complete wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1930.597
Dura no. unknown
Length 318 mm

A short shaft, complete but for the loss of the two vanes, which were housed in grooves. Made of pine (*Pinus* sp.). The head is tapered for a socketed head.

824

Broken wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1931.590f
Dura no. unknown
Length 425 mm+

A slightly waisted shaft, broken probably just behind the socketed head; it was clearly tapering in towards the whittled point at the place of breakage. The shaft is faceted from knife-shaping, and is badly insect damaged at the rear. It is slightly bent, probably as a result of pressure during burial.

The two vanes, originally housed in saw-cut (?) grooves, are both lost.

825

Broken wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1931.590e
Dura no. unknown
Length 372 mm+

Made of ash (*Fraxinus excelsior*; probably identified by Prof. Record, *Rep*. VI, 455). Like **823** it is slightly waisted, and seems to have had a socketed head attached, and later snapped off, probably deliberately; it appears to be broken where it tapers in to the point.

The two vanes, both lost, were housed in saw-cut (?) grooves.

826

Broken wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1931.590c
Dura no. unknown
Length 443 mm+

A heavy bolt, broken at the fore end. The two vanes, both lost, were housed in saw-cut (?) grooves.

827

Broken wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1938.5999.1063
Dura no. unknown
Length 292 mm+

A heavily worm-eaten shaft, broken at the fore end. The horizontal stabilizers, now lost, may have been made from a single piece of wood as they were housed in a mortise which completely pierced the shaft. They are now lost.

828

Broken wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1929.434c*
Dura no. unknown
Length 195 mm+
* Likely, but not certain.

Both ends are burnt. The fore end is broken. The two flights, both now lost, were housed in grooves.

829

Broken wooden bolt shaft originally with two vanes
Provenance unknown
Yale no. 1931.590j
Dura no. unknown
Length 203 mm+

The fore end is broken. The two vanes, both lost, were housed in grooves which were almost certainly cut with a saw.

830

Complete wooden bolt shaft originally with two vanes
Provenance unknown
Royal Ontario Museum no. 933.25.27 (part of)*
Yale no. 1931.590i*
Dura no. unknown
Length (shaft) 437 mm
* Along with iron bodkin **782**, with which it was allegedly associated (although this is highly dubious: see below), this was probably originally Yale no. 1931.590i, but was long ago transferred to the Royal Ontario Museum (information kindly supplied by Dr J. Hayes, supplemented by my own inspection).

The following description has kindly been supplied by Dr J. Hayes:

> hardwood shaft . . . of close-grained wood, thickens gently towards butt end, with conically pared point (fitting inside head). Butt end pared down on two sides to form a flat tongue with thinnish square-cut end; the chamfered transitions to main part of shaft bear median slots, continued along either side of shaft for about one third of its length, to receive thin wooden fins . . . The remains of one fin are lodged in its slot . . . Wooden shaft complete (minor damage close to tongue?), split in two across middle (glue remains); fins missing apart from some remains in one slot. Wood well preserved. . . . Weight of shaft 42.5 g . . .

It is unclear on what basis this shaft and head **782** are considered to be associated. The socket is relatively large, and is loose on the shaft. Indications from other examples (e.g. **821**) are that the heads were small and fitted tightly. My own inspection identified bruising marks part way down the conical tip of the shaft, consistent with the original fitting of a much smaller head. Consequently, I think it most unlikely that the two objects really belong together.

831

Broken wooden bolt shaft originally with two vanes
Provenance: 'Palmyrene Gate'*
Yale no. 1929.434f
Dura no. unknown
Length 378 mm*
* Details from Yale catalogue card. This corresponds in size to one of two bolts mentioned in *Rep*. I, 18.

Faceted, and worm eaten at both ends. However, its length seems to be virtually complete. The fore end appears to preserve part of the tapered tip, and perhaps traces of bruising from fitting a head. It originally had two flights, in grooves.

832

Complete wooden bolt shaft
Provenance: 'Tower of the Archers'
Louvre no. AO 28430*
Length 290 mm
* Information provided by M.J. Castor, Louvre.

Published in Cumont, 1926, 260, pl. XCVII:2 (on which the drawing presented here is based). One of two published by Cumont (see also **833**). Details drawn from the published account.

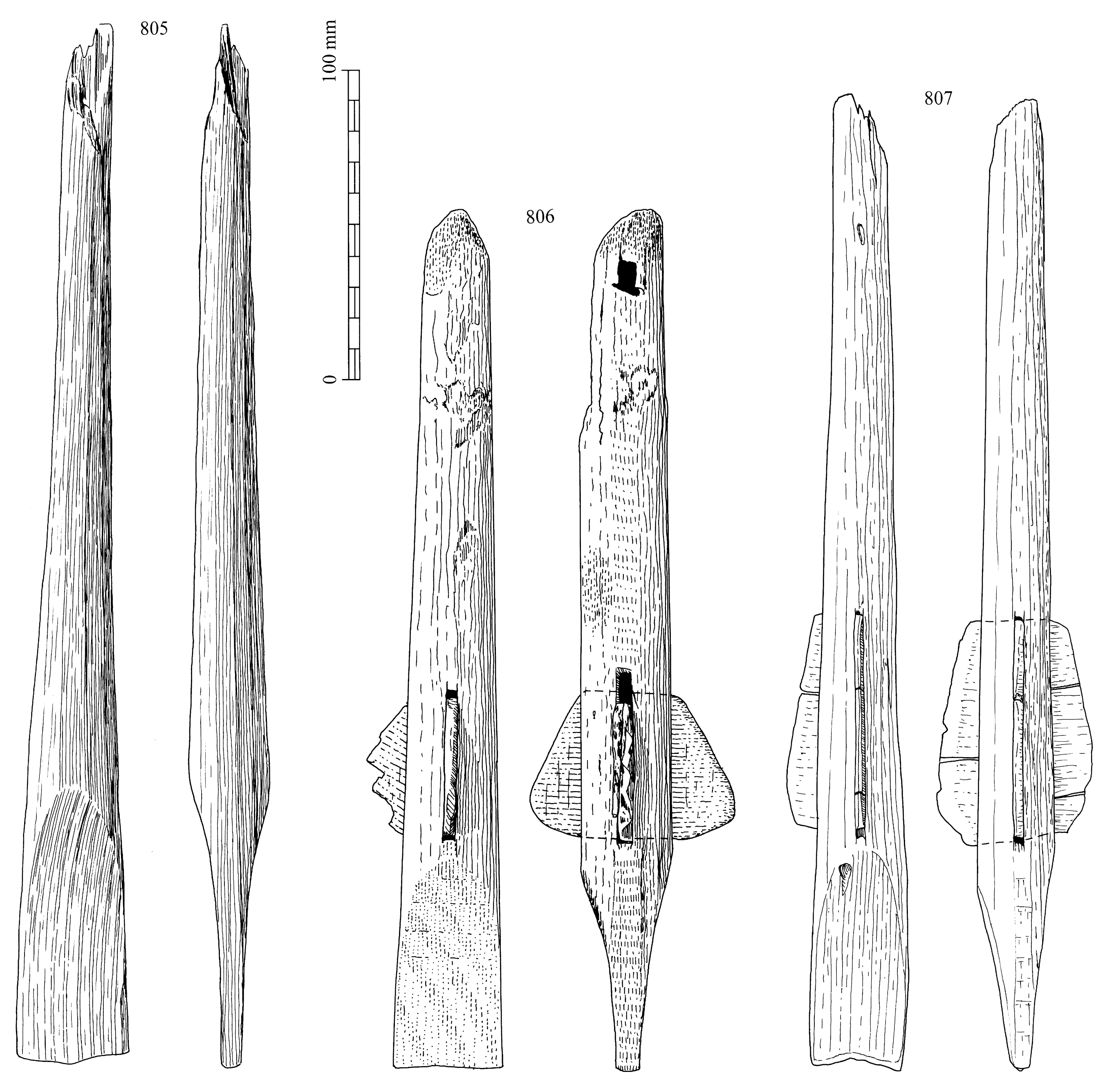


Figure 131 Catapult ammunition: wooden shafts **805** to **807**.

Allegedly tamarisk. Apparently this originally had two flights, housed in saw-cut (?) grooves. Both are now lost. Referring to this object, Cumont wrote: 'Au moins l'une des deux etait coupée dans une autre branche de tamaris et fixée à la première par une cheville, enfoncée dans la tranche, et par un fil enroulé et enduit de colle.' (Cumont 1926, 261).

The published photograph clearly shows the square-cut end and the anti-split binding, of fibre soaked in glue. I suspect that Cumont may have been mistaken in thinking that the shaft was composite, and that the forepart was also of tamarisk. The function of such a structure is difficult to understand. It seems more likely that the shaft was simply designed to take a tanged head. However, it may be that the socket preserves the remains of a wooden peg *in situ* (Cumont is unclear on this point). Without inspection of the object, certainty is not possible. Certainly composite bolt shafts were used in earlier times (see **805** for references). Since it has now been established that this piece is among the Louvre's holdings of Cumont's material, further research being undertaken by others on that collection may throw more light on this matter.

833

Broken wooden bolt shaft with two vanes

Provenance: 'Tower of the Archers'
Louvre no. AO 28429*
Length 210 mm+
* Information provided by M.J. Castor, Louvre.

Published in Cumont 1926, 260, pl. XCVII:1 (on which the drawing presented here is based); Caubet 1990, no. 45. One of two published by Cumont (see also **832**). Described as probably tamarisk. Burnt at both ends. The two flights, with 'swept' grain, are both largely intact.

834 to 842

Wooden bolt shafts* (not illustrated)

Provenance(s) unknown
National Museum, Damascus nos 3444 to 3452*
Dura nos unknown
* On a record card at Yale, which also says 'Nine arrow shafts from catapulta.'

No further details known.

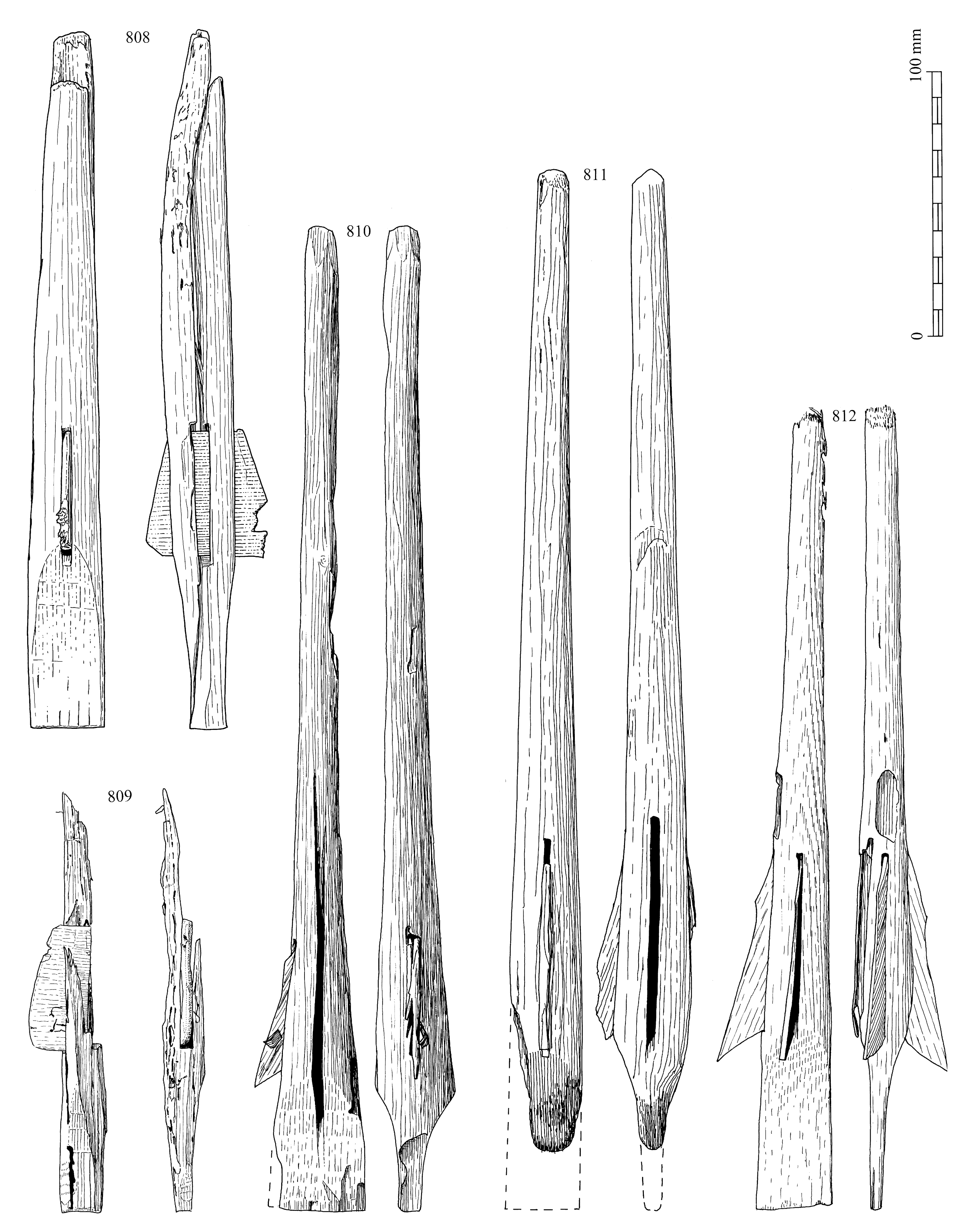


Figure 132 Catapult ammunition: wooden shafts **808** to **812**.

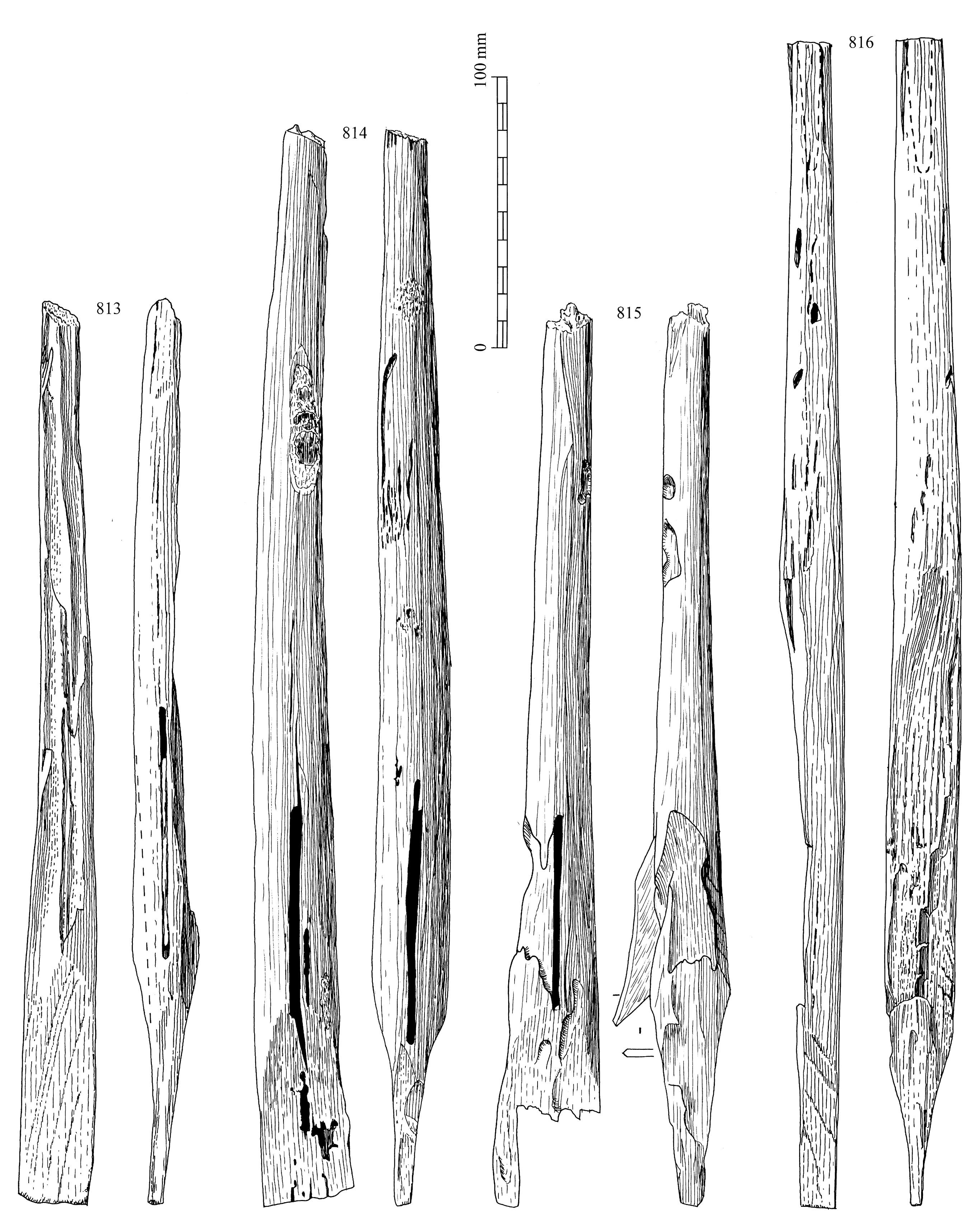


Figure 133 Catapult ammunition: wooden shafts **813** to **816**.

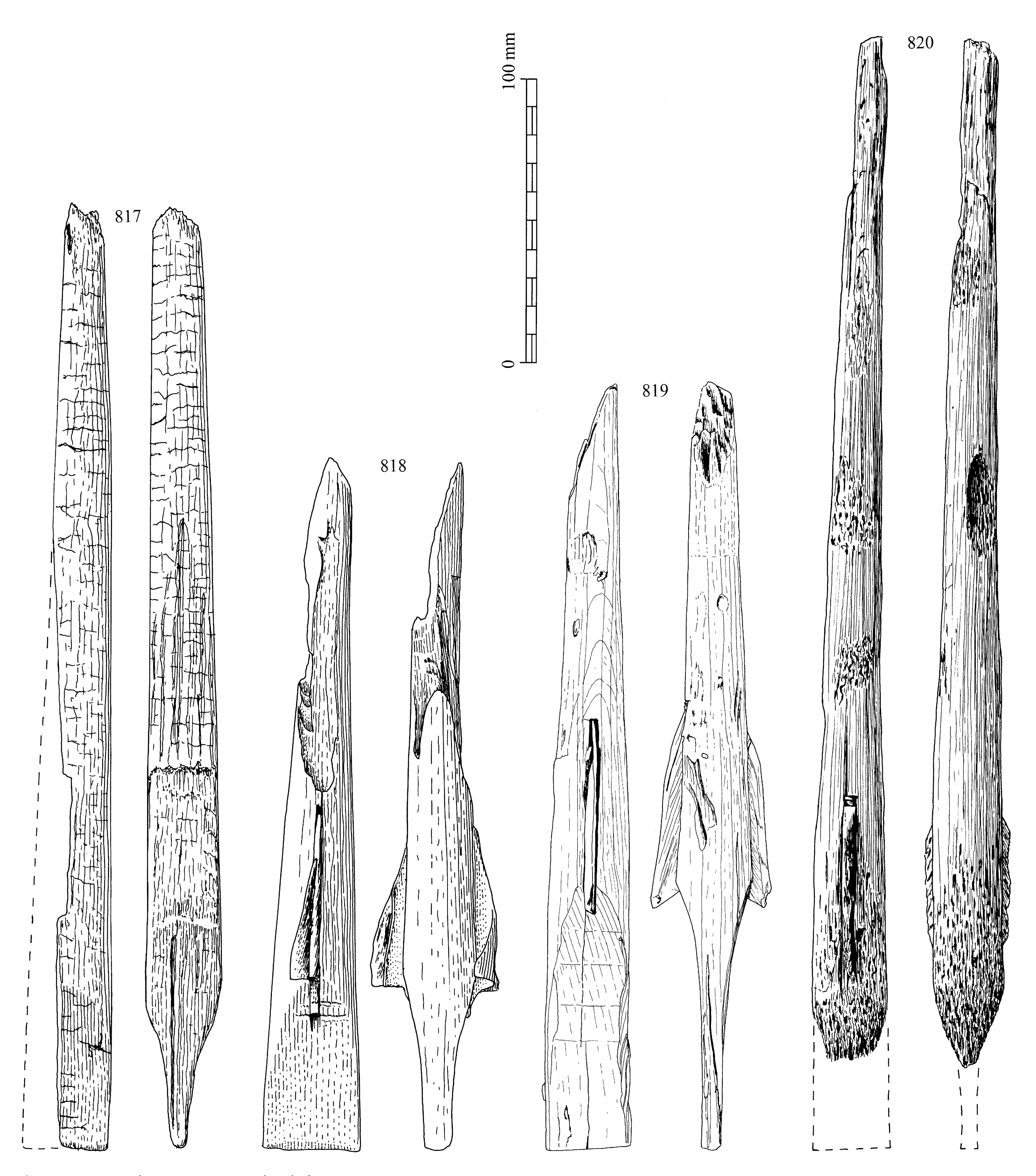


Figure 134 Catapult ammunition: wooden shafts **817** to **820**.

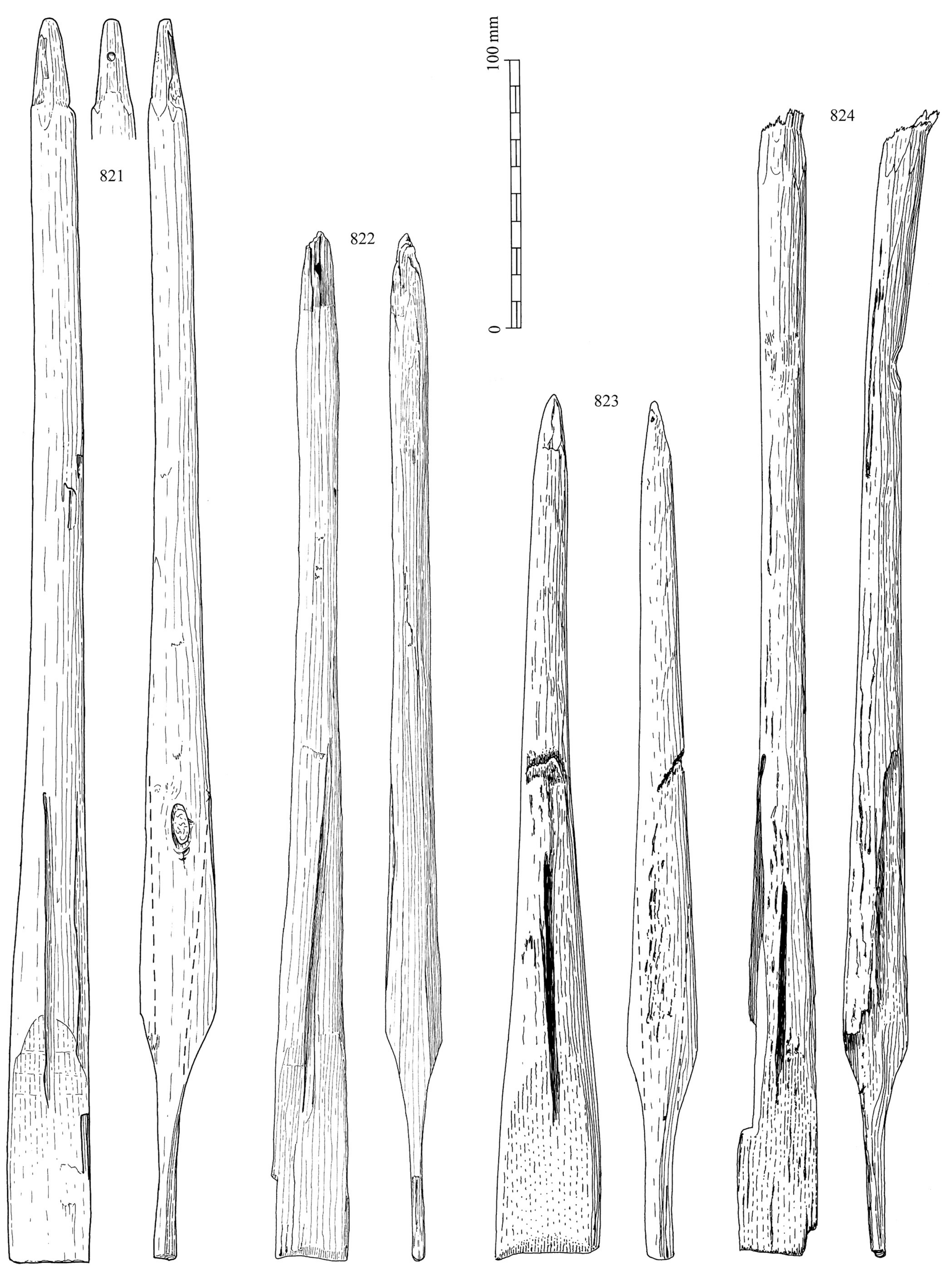


Figure 135 Catapult ammunition: wooden shafts **821** to **824**.

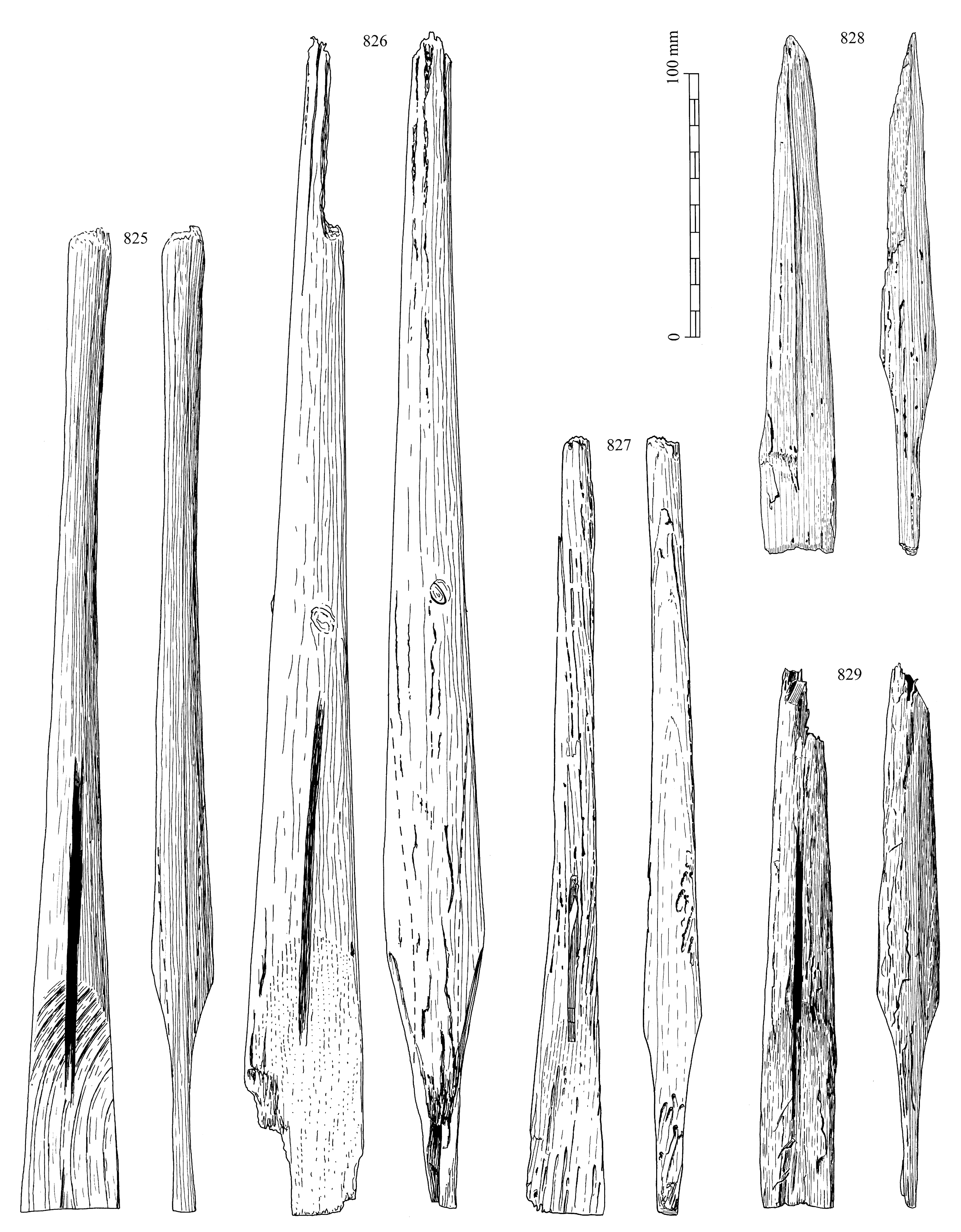


Figure 136 Catapult ammunition: wooden shafts **825** to **829**.

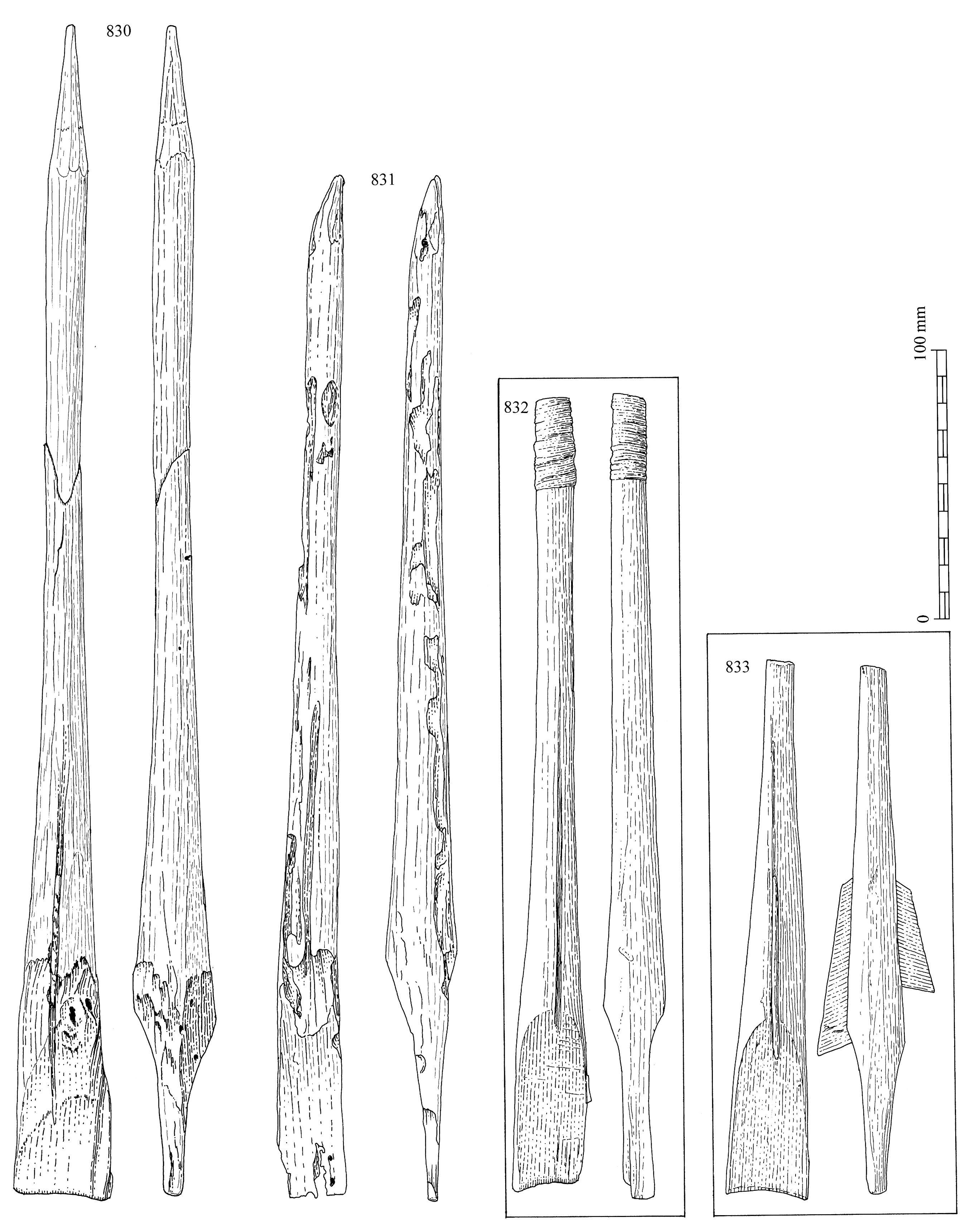


Figure 137 Catapult ammunition: wooden shafts **830** to **833** (**832** and **833** drawn from photographs, after Cumont 1926; scale approximate).



Figure 138 Wooden bolt shafts **806** (left), **810** and **812** (right). **810** was found with a head attached, but the association was lost. Another head is substituted here, for illustration purposes only.

Stone artillery projectiles

843

Carved gypsum artillery stone (not illustrated)
Provenance unknown
Yale no. 1930.533c
Dura no. unknown
Diameter 70–75 mm

A carefully rounded stone of whitish gypsum, with chisel-marks. Stones identified as artillery projectiles are often found, but little useful work has been done on them. Examples include Bar Hill (Robinson *et al.* 1975) which produced sixty-four balls: twenty-three *c.*60 mm diameter (weighing 350–400 g), eighteen at *c.*80 mm (650–750 g), twenty-four at *c.*100 mm (*c.*1000 g) and nine at *c.*120 mm (1500–2500 g). For balls from Strasbourg, see Forrer 1917. For the Danube frontier, see Buciumi, Romania (Chirila *et al.* 1972, 66). Artillery stones from Masada were examined by Holley (1994). For analysis of a large new group of projectiles recently excavated at Dura itself, see James forthcoming.

844

Carved artillery stone (not illustrated)
Provenance unknown
Yale no. 1930.533e
Dura no. unknown
Diameter 70–75 mm

A rough sphere carved from soft greenish stone.

845

Possible artillery stone (not illustrated)
Provenance unknown
Yale no. 1930.659
Dura no. unknown
Diameter 60–70 mm

This pebble of brown chert-like stone is clearly a hammerstone of probable prehistoric date. It is presumably at Yale because the excavators thought it was an artillery projectile. Indeed, it is ideal for the purpose, being much denser than the local gypsum, about the right size and shape, and probably prone to shattering on impact. It therefore may well have been reused by the garrison for this purpose.

846

Possible artillery stone (not illustrated)
Provenance unknown
Yale no. 1938.5999.1116
Dura no. unknown
Diameter 80–90 mm

Another chert-like hammerstone like **846**, perhaps reused as catapult ammunition.

847

Carved artillery stone (not illustrated)
Provenance unknown
Yale no. 1938.5999.1113
Dura no. unknown
Diameter 60–70 mm

A rough sphere carved from greenish stone.

848

Carved artillery stone (not illustrated)
Provenance unknown
Yale no. 1938.5999.1114
Dura no. unknown
Diameter 70–75 mm

Greenish stone with a rough surface lacking obvious tool marks.

849

Carved artillery stone (not illustrated)
Provenance unknown
Yale no. 1938.5999.1115
Dura no. unknown
Diameter 65–70 mm

A whitish sphere without tool marks. See **843** for parallels.

850

Carved artillery stone (not illustrated)
Provenance unknown
Yale no. 1930.661
Dura no. unknown
Diameter 80–95 mm

A flattish sphere of white stone. See **843** for parallels.

851

Carved artillery stone (not illustrated)
Provenance unknown
Yale no. 1938.5999.1117
Dura no. unknown
Diameter 145–150 mm

A larger white stone sphere.

Part 3

Discussion

Discussion

Having set out the composition of the surviving assemblage, and discussed each category individually, it remains to take an overview of the material, and to seek to draw more general conclusions about it. In particular, the assemblage needs to be compared with others, especially with examples from Roman Europe. Dura and other collections mutually inform each other. However, we need to understand how comparable they are, not least in terms of what happened to them after burial.

The Dura material is, of course, a modern sample of what survived in the earth for over sixteen centuries, which was a fraction of what was originally deposited; and that was itself already a selection of the original population of martial artefacts in circulation (or already buried) at the time of the siege. Since we would like to understand the nature and composition of that original population so that we may discuss and interpret it, we must first attempt to understand what subsequently happened to it. So far as we can, we must try to work backwards through the post-depositional transformations it has undergone, to the processes which led to its deposition, to the acts of selection which this involved, and so to the 'living' population of artefacts. We cannot definitively reconstruct the last, but we may at least be in a position to judge the significance, or otherwise, of recorded spatial distribution patterns, presences, relative proportions, and apparent absences of various categories of artefact or materials of manufacture.

After reviewing these issues, provisional conclusions may be drawn on what the assemblage can actually tell us about soldiers at Dura, and how all this fits into regional and imperial contexts.

Finally, we can review the results in relation to the original research questions and those which arose during the project, and outline future prospects regarding Dura's place in, and potential contribution to, the writing of wider military history and archaeology.

Deposition and transformations of the material

Since we wish to make statements about the original attributions, uses and significance of the military artefacts, we must first seek to assess how far the surviving sample truly represents the make-up of the original 'population' of artefacts in circulation at Dura. This therefore demands careful consideration of depositional and post-depositional processes at the site, and their roles in selecting from the 'living' population of martial artefacts, and transforming these into the recovered assemblage. From this, we can seek to assess how far these may have distorted the original picture, and therefore how far we should take the existing data at face value, or to what degree the original composition of the assemblage may be reconstructed.

Post-depositional transformations

The broad processes which affected artefacts in most parts of the city after burial – notably differential decay of organic materials and the less resistant metal objects – were discussed above (pp. 29–30). The conditions prevailing across the mostly flat interior of the town obviously contrasts strongly with the special dry microenvironment along the walls which resulted in the exceptional near-perfect survival of a modest number of items.

Since the site was in effect permanently abandoned after the siege, pre-twentieth-century stratigraphic disturbance is not a significant factor. Further transformations of the record have occurred during and since excavation, which was, of course, itself a further process of selection. As we have seen (pp. 4, 26–8), excavation and record keeping were of variable quality and sometimes questionable practice, even by the standards of the times, largely due to external pressure to get visible results quickly. It is clear that no attempt was made to keep everything that was found, and the style of excavation probably ensured that many small items such as those which form much of the present catalogue (e.g. fragments of bone fittings) will have been missed or, conceivably, even discarded by excavators as uninteresting. Both the quality of recording, and the extent of excavation, were highly variable from season to season and from area to area, which has major implications for questions of spatial distribution (see below). Even where findspots are noted, a fundamental loss of data arose from the general failure to record stratigraphic information.

A further loss of potential data followed excavation and collection, partly due to the shortcomings of the recording system and inconsistency in its application. This was compounded when labels became disassociated in transit or in museum storage, and mistakes and confusions arose between objects, site records, application of accession numbers to pieces, and their documentation in the Yale catalogue, collectively resulting in a further marked degrading of the available data. There were also some additional physical transformations, such as progressive deterioration of some pieces and excessive cleaning of others during early conservation efforts. Finally, of course, there is my own inevitable contribution to the distortion of the record through the further process of selection which I have applied in assembling this report, one arising from my own approach and imperfect knowledge. Not least are the difficulties of defining what is military (pp. 6–7), and then correctly selecting for inclusion all categories and examples, especially where many items are corroded or distorted beyond the limits of identifiability.

However, notwithstanding all these factors, we need not be completely pessimistic: the record as presently constituted still provides valuable insights into the processes of deposition of the material.

Depositional processes at Dura

In the past, little attention was paid to the significance of processes of deposition of military equipment (or indeed of archaeological assemblages in general), perhaps because they did not appear to be problematic. Apart from relatively rare finds of arms in graves, individual discoveries and even substantial assemblages of Roman military equipment have in the past simply been regarded as the result of carelessness or accident, using the simple analogies of coin-loss or catastrophe. Various ways in which artefacts can become incorporated into the archaeological record may be identified, through accident or deliberate action. The former includes casual loss of small items, dropped and easily buried in the same way as coins and finger-rings, or more spectacular deposition of items through fire, earthquake, sinking of boats, siege warfare, etc. Deliberate action can be divided into conscious discard (e.g. of items regarded as valueless rubbish) or formal deposition (such as grave-offerings or hoards).

On examination, deposition of large and elaborate military artefacts through misadventure is often hard to believe, although once frequently presumed even for deposition of substantial numbers of swords and helmets in rivers (Bishop and Coulston 1993, 33–4). It is now generally accepted that such groups represent deliberate acts of deposition for symbolic, presumably ritual purposes, e.g. as religious or funerary offerings. While the notion of offerings, of arms in particular, deposited in rivers, springs and bogs is well established for later prehistoric Europe (Bradley 1990), and of course continued in the spectacular Danish bog deposits of the Roman Iron Age (Engelhardt 1863, 1865, 1869; Ilkjaer 1993), we are now becoming aware that such acts were much more common in the Roman empire – at least in the West – than we had realized, and not only in aquatic contexts (Bishop and Coulston 1993, 37–8). Study of artefact deposits in pits and enclosure ditches of Iron Age British settlements has revealed that, far from containing casually discarded rubbish, they are, frequently if not always, the result of careful selection and conscious, often elaborate acts of 'structured deposition' which were apparently governed by religious or cosmological beliefs, and the cycles of life and production (Hill 1995). It is increasingly believed that structured deposition is also to be encountered on military and civilian sites of the Roman period, and not only in clearly 'ritual' contexts like temple offerings and grave-groups (e.g. in the Newstead 'rubbish pits': Clarke 1997). This is now a facet of the formation of archaeological records which needs routine consideration.

In the light of such trends, a much more sophisticated approach is now being taken to understanding the archaeological deposition of material such as military equipment (Bishop and Coulston 1993, 33–41). It is now generally accepted that in peacetime redundant metal items, at least, were normally recycled; while after battles discarded or abandoned equipment was collected, and the dead usually stripped before disposal. Apart from the plausible accidental loss and burial of small items, which probably is indeed analogous to the constant trickle of coin-loss (Bishop and Coulston 1993, 34), where military material survives today it does so either because it was accidentally buried beyond reach of recovery, or because it was deliberately interred, whether to deny it to the enemy or for religious reasons. Examples of deliberate interment in the Roman West include the Corbridge hoard (Allason-Jones and Bishop 1988), while the burial of helmets in pits at Newstead (Clarke and Jones 1996, Clarke 1997) and on the Kops plateau, Holland (van Enckevort and Willems 1994), are best explained as ritual deposits. (See Bishop and Coulston 1993, 33–4, for a more detailed discussion of all these issues.) It is not common to find military equipment in circumstances clearly to be interpreted as inadvertent burial, although examples are known, arising from disaster (such as the late third-century AD mail coat and greave recovered from fire debris in barracks at South Shields: Croom 1997) and combat: e.g. at Olynthos (Lee 2001), Hatra (notably producing a major catapult find: Baatz 1978) and of course much of the Dura material itself.

The consequence of the new interpretative framework, which is based primarily on western evidence, is that it is becoming ever clearer that we cannot take the assemblages recovered from Roman military sites in Europe as being simple representative samples of the population of arms and equipment in daily use; they are usually – probably always – heavily selected and biased in varied ways. However, do these concerns also apply to the very different cultural conditions of the East in general, and Dura in particular? The depositional processes at Dura, at least for the major stratified groups (especially in and around Tower 19) were largely non-deliberate, and actually occurred in the heat of battle, so we might hope that they have left a more truly representative sample of Roman and other equipment. If so, this would contrast significantly with other excavated Middle Eastern sites which, in general, seem to produce much lower densities of small finds than sites in the West (p. 5).

As was noted above (p. 5), while our knowledge of the East is much thinner than that of Europe, deposition of military equipment is known, both in hoards and occasionally in graves. However, neither of these processes appear to be significant at Dura. While hoarding of coins and jewellery is attested (Bellinger 1949, James 1985, *Rep*. II, 10, 76), no clear evidence of deliberate, potentially ritual, deposition of military equipment prior to the siege preparations has been recognized. A cluster of harness fittings from a shrine-room in the Temple of Azzanathkona might be an example of an offering, but it is more probable that the space was deconsecrated and used simply as an equipment store during its last years (below). The only reasonably secure case of grave deposition is the group of arrowheads, probably representing a quiver of arrows, in Tomb 24, Loculus XIV (*Rep*. IX.ii, 57, pl. XLVI; **688** to **690**, **708** to **710**).

It is fairly clear that, in general, the spectacular groups of finds buried in the special environment of the 'desert' wall embankment, the towers and the mines, owed their initial deposition to the preparations for the siege or to the fighting itself; and subsequently lay undisturbed because the defences were never reconstructed. These major excavated groups were either deliberately discarded (the stack of shield-boards, stripped of all metal fittings) or more or less the result of accident, arising from actions with other intentions, e.g. the Tower 19 mine assemblage deposited as a consequence of the fight for control of the tunnels. Preservation of the horse armours etc. in the tower itself was a fortuitous side-effect of the failure of the mine to cause the tower to collapse completely.

But what of the substantial scatter across the site of loosely provenanced, or completely unprovenanced, certain or probable military objects, including brooches? The fragmentary provenance data does at least show that these were distributed right across the town. Are we to assume that this material, too, was generally laid down as a direct result of the siege, during the fighting itself and the sack which is presumed to have followed? Or do they represent debris accumulating during the long-term Roman (and other) military presence in the city? One might expect some cumulative peacetime 'casual loss' in the town, in such locations as the dust or mud of the streets, or in odd corners of buildings when occupants changed, on the coin-loss analogy discussed above. If, as is quite possible, both these factors contributed to the present record, can we distinguish between the components?

Lack of proper stratigraphic details, even for artefacts with recorded provenance, makes such distinctions highly problematic; it is generally impossible to tell whether they were found in early deposits, were redeposited residual items, or were dropped around the time of the siege. However, the composition of this component of the collection provides some hints about the circumstances of its burial.

For example, on typological grounds the copper alloy arrowheads are clearly from earlier times, some even pre-dating the foundation of the town, others perhaps accidental losses during its earlier history, representing the coin-loss-like component of deposition mentioned above. Together with the group of Aucissa brooches and one or two other early items such as the mail-hook (**414**) and a possible first-century saddle plate (**367**), it seems clear that there is indeed a pre-siege component to the town-interior assemblage.

However, it is unlikely that very large amounts of equipment were deposited within the town much before the siege. As we have seen, it is now thought that equipment on Roman military sites in Europe was usually carefully curated, and other explored Eastern sites generally produce very few such items. At Dura, the evidence is consistent with a fairly effective pre-siege regime of rubbish disposal in the city; artefacts left lying around, including military equipment, were scavenged or stolen, recycled or dumped off-site. The stratigraphy at Dura is generally shallow; buildings tended to be solid and long-lived relative to the quite short history of the town and, except in Wall St, rubble or rubbish was not permitted to accumulate as on archetypal Tell sites. Except within the artificial embankment along the walls, deposits are mostly no more than a metre or two in depth across the plateau on which most of the city stands. This was not least because, at least during the last century of the life of the city, much waste and debris was removed and dumped in a vast midden outside the Palmyrene Gate (*Rep*. IX.iii, 3–4).

To summarize, it seems most likely that the great majority of the military material recovered from the interior of the town, like that found along the walls, was deposited shortly before, during or immediately after the siege. The new excavations near the Palmyrene Gate are dramatic evidence of this, revealing a workshop apparently producing and stockpiling stone and iron artillery projectiles during the fighting (Leriche 1997, 91–2; James forthcoming). The ferocity of the fighting revealed by archaeology suggests that, whether the city was taken by storm or surrendered, a chaotic sack and looting is to be expected, with the victors having leisure to pick the town clean afterwards. Either way, since they subsequently evacuated the city, one would expect that anything of any value which the conquerors could find was removed. A peculiar pattern of damage to some scabbard slides may reflect looting: a number were found broken in such a way that deliberate tearing from the scabbard rather than routine wear and tear is suspected (e.g. **534** to **542**), although why this should have been done at all is far from clear.

So, a case can be made that the material recovered from the interior of the town represents at least two depositional phases – a small 'pre-siege' component and a far larger 'peri-siege' group – now collapsed onto each other and indistinguishable due to loss of stratigraphic data. More complex structuring might have been both inherent and detectable in the archaeological deposits, but would have been lost due to the excavation and recording techniques employed.

Neither is it possible to draw many detailed conclusions from the composition of the assemblage surviving from the interior of the town. For example, a number of major categories of equipment, such as spearheads and helmets, seem to be largely or entirely absent from the interior, a situation which it is tempting to put down to systematic looting and salvage after the fall of the city during which only small and/or broken items were ignored or missed. Within the town, then, the composition of the recovered assemblage is almost certainly the result of strong selection processes which governed what was deposited and what was not. However, differential decay subsequent to deposition is also a very important factor to consider here. Items of copper alloy scale armour, for example, are relatively rare in the interior. But it is noteworthy that many *surviving* items of copper alloy equipment from the interior are of relatively robust manufacture, notably cast pieces. Evidently, thin copper alloy plate has often corroded away, and may have been deposited in quantities much larger than now appears. Iron objects, inherently more chemically reactive than copper-based pieces, were even more vulnerable away from the protective embankments; paradoxically, and in contrast to copper alloy pieces, larger forgings such as sword blades, shield bosses and helmets actually seem to have been more vulnerable to total disintegration than small ones like arrowheads.

To conclude, although much at Dura was buried by accident, the result proves to be no 'Pompeii'; overall the assemblage does show strong evidence of selection processes, including human choice and differential preservation of different components. Further, it will be argued that statistical chance also played a role in deciding the composition of the surviving assemblage. It is no simple cross-section of, or 'window' onto, the original population of artefacts.

Spatial distributions

While proper stratigraphic information is largely absent, particularly away from the wall deposits, simple findspot data does exist for many items, at best locating them to a specific room in a building, but often no more precise than a block or street (p. 28). Does this reveal any informative general distribution patterns across the city? Frisch and Toll noted that 'pierced bronzes' were found all over the city, but with some concentration in the military district, and partly on these spatial grounds thought they were military equipment (Frisch and Toll

1949, 2). Further, does surviving spatial distribution data allow us to reconstruct groups of artefacts, now scattered in the collections but originally meaningfully associated?

It was hoped that findspot data might permit suggestion of possible lost associations between catalogued artefacts. Had complete items such as, for example, whole belts or bridles been buried, we would expect some sign of coherent groupings in the records. However, in the event there are relatively few such coincidences of findspot, indeed rarely more than one item from any specific locus (such as a given room), emphasizing that, although many items were found, the excavated area was vast, and density, at least of recovery, was quite low.

Most of the main groups of artefacts sharing a common place of discovery (but not necessarily original stratigraphic association) make little clear sense now, in terms of items of equipment, e.g. belt-sets or other pieces of harness. For example, in the *agora* district G1-36 produced a crossbow brooch (Frisch and Toll 1949, fibula 52), a button-and-loop fastener (**129**), a suspension loop (**115**), parts of scale armour (**433** and **491**) and a snaffle-bit cheek-piece (**329**); G2-40 produced a knee-brooch (Frisch and Toll 1949, fibula 24), a belt plate (**94**) and a chape (**578**).

An important exception, however, is the group of copper alloy fittings sharing the provenance E7-W9, including strap stud **316**, pendant **158** and a group of ivy-leaf pendants, **201**, **207**–**212**, and **214**. Possibly representing a single set of horse-furniture, their location places them in the *pronaos* of one of the two sanctuaries in the Temple of Azzanathkona (*Rep*. V, 171–80), which had been the headquarters of *cohors XX Palmyrenorum*. The finds are not mentioned in the *Report*.

With regard to the wider distribution patterns across the city, an instructive test of the potential and the problems of the data is provided by the case of the distribution of one category of at least partially military artefacts, which has been commented upon in the past: brooches. Frisch and Toll considered that the general pattern of discovery within the town points to military associations, with no less than eighteen brooches coming from the west wall, seventeen from the military cantonment area, twenty-one from the ‘market’, and twenty from other places. Of particular note is the concentration of crossbow brooches along the city wall (Frisch and Toll 1949, 45).

Plotting the distribution of copper alloy brooches (Fig. 139) shows this apparent clustering. However, at the coarsest level of analysis, this simply reflects the principal foci of excavation, e.g. along the length of the ‘desert’ wall, in the military cantonment, and across the centre of the town. Yet a number of excavated areas stand out as lacking provenanced brooches. Is this a real absence, suggesting some clear structure to the distribution? Two factors suggest not. Firstly, excavation across the city was of widely variable degrees of thoroughness, as a recent study by Allara has shown; some areas were largely excavated to bedrock, in others little more than the tops of walls were cleared, to reveal the plans of buildings (Allara and Saliou 1997, 147, fig. 1). The greatest densities of brooch finds tend to correlate with the most thorough and intensive excavation. Secondly, and of equivalent impact on distribution patterns, is the fact that for the first four seasons no systematic records of object findspots were kept at all (p. 28). Unsurprisingly, a number of the gaps on the brooch distribution map turn out to be areas excavated in those seasons (e.g. H4, Temple of Artemis; D5, House of the Large Atrium). It is probable that many of the dozens of unprovenanced brooches came from these locations. It may be that, despite these serious distorting factors, some structuring exists within the distribution of brooches and other categories of artefacts, but it is far from apparent.

The limited and inconsistent recording of provenances and, even where locational information survives, the absence in most cases of any stratigraphic information, places the severest constraints on attempts to identify meaningful patterning in the distribution of the material across the city. Given the major demonstrable distortions in the record, it seems that little more of great value may currently be said regarding artefact distributions across the city (although it may be worth considering further work on this aspect at a future date, especially in the light of possible further archival research, and new survey and excavation work currently being carried out at Dura). We will therefore now turn to a consideration of the internal structure of the collection.

Composition and attribution of the assemblage

Composition: presences and absences

It is clear from examining the material that certain depositional and post-depositional processes have had extremely powerful effects: dryness preserving everything including organic materials in some contexts, while in others exposure to seasonal rains and chemically hostile soil conditions destroyed virtually everything including many metal items. It is possible to make a rough, and sobering, estimate of the size of sample in our possession relative to the original total present in the city under Roman occupation, in peacetime or during the siege. Apart from weapons and armour, each Roman soldier at this period wore about a dozen fittings, usually metal, on his clothing and personal equipment: buckles and strap ends, brooches and baldric fittings, etc. If Dura’s garrison was around, say, 2–3,000 men at the time of the siege (it could hardly have been fewer to defend so long a wall-circuit, and could well have been considerably larger in such special circumstances), then there should have been something like 30,000 dress fittings in the city, plus thousands of horse-harness fittings. This suggests the surviving sample of something over three hundred fittings is of the order of 1%, at most, of the original ‘population’. For other, physically larger, categories of objects like helmets and shields which were generally less likely to have escaped post-siege looting or salvage, the proportion is apparently lower still, of the order of 0.1%. Given such statistics, what are we to make of the apparent absence of certain categories of material from the assemblage, items which we might expect originally to have been present at the site from our knowledge of broadly analogous assemblages found elsewhere? There are several reasons to treat apparent gaps with caution, and not to jump to the conclusion that they represent real differences between Dura and its mostly-European comparator assemblages.

One possible explanation for apparent absences from the surviving sample is simply differential decay, arising for example from the hostility to survival of iron of the burial environment away from the mural embankment. This could have largely or wholly eliminated entire categories of

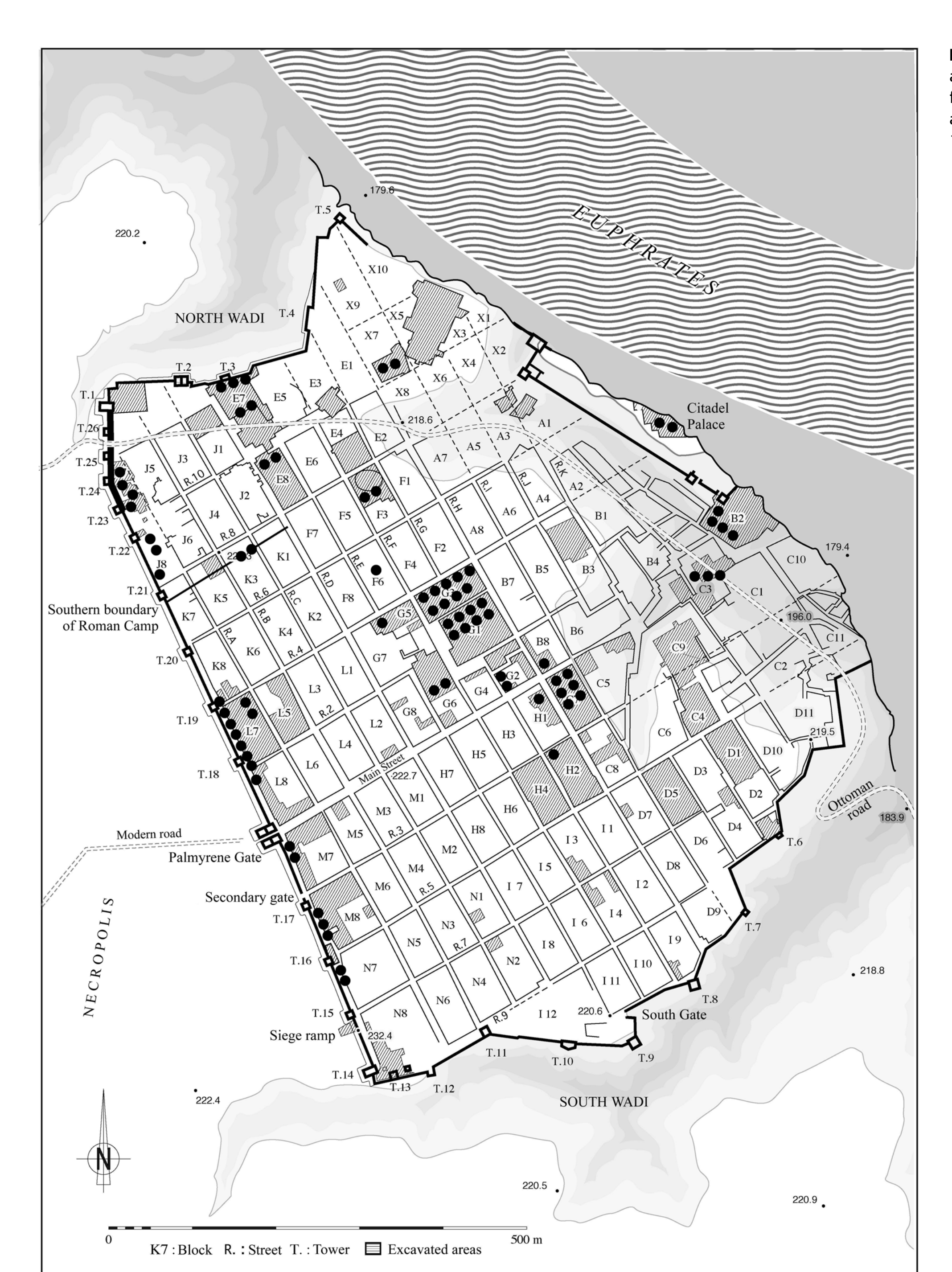


Figure 139 Distribution of copper alloy brooches by city block (data from Frisch and Toll 1949; base map adopted from Leriche and Gelin 1997, viii).

equipment, even types commonly found in the less hostile soil conditions of many European sites, almost regardless of how many examples had originally been deposited on the site. It might, for example, explain the apparent lack of iron scabbard slides at Dura. Another possible explanation for apparent absences of types may be the nature of excavation practices: e.g. certain items may not have been recognized, or for some reason were not systematically collected. So, for example, since bone seems not generally to have been recovered during the excavations it is likely that many fragments of bone artefacts were ignored, unless they were very obviously worked or embellished (Russell 1976).

Of course what survives is also a sample biased towards durable materials, and some categories are attested by numbers sufficiently small (a handful of pieces, or even a single example) to raise suspicion that certain other known categories or types may have been in use at Dura, but are absent from the surviving sample due to simple mathematical chance. More unusual types of pendants or scabbard fittings, for instance, if they comprised only one percent or less of the original population of such items, might easily fail to be represented in a preserved sample of this size. For example, no fragments of 'IOVI CONSERVATORI' openwork baldric mount sets were identified at Dura. These types are quite well known in Europe, although perhaps because they are eye-catching and likely to be published rather than numerically common. Is their apparent absence from Dura real, or a result of chance lack of representation of a quantitatively minor element of the original population? If it were not for the recovery and identification of just one fragmentary belt plate (**78**), the contemporaneous and analogous 'FELIX VTERE' lettered belt-sets would also appear to have been absent from Dura.

The role of chance in selecting the assemblage is surely to be seen in the wonderful material preserved in Tower 19. If, as seems plausible, the lower rooms were a store for damaged equipment awaiting repair, it is largely down to contingency that we have today the only complete rectangular shield and the only intact horse armours from Roman Antiquity, rather than that still elusive prize, a perfectly preserved scale shirt, or even so modest an item as a complete leather waist-belt.

There is the further important caveat that, except for items common elsewhere, apparent absences from the excavated assemblage must be treated as provisional, because types now absent may once have been represented by sole survivals *subsequently* abstracted from the known collection, precisely because they stood out as different or unusual. An example of how such potentially distorting post-excavation selection might have occurred is provided by the leaf-shaped bolt-heads (**795** to **803**), a type known elsewhere in the Roman empire, and present in the assemblage but, at the time of my study, apparently undocumented in the Yale records. All the Dura examples had been selected long ago for long-term loan to the Higgins Armory Museum, where their existence came as a complete surprise. Further, the early transfer of another handful of military items from Yale to the Royal Ontario Museum is apparently undocumented in the Yale Dura archive; its existence only came to light by chance. It is possible, if not especially likely, that there were other such now-forgotten transfers which could have removed unique items from the known assemblage.

The case of helmets provides a good illustration of the probable combination of several factors impinging on the present structure of the assemblage, and complicating its interpretation. Why is there such thin evidence for helmets from Dura? We have one extraordinary 'Sasanian' piece, and a handful of fragments of Roman types. Did elements of the Roman garrison at Dura just not use helmets much, perhaps due to cultural preference (pp. 102–3)? The Roman soldiers who died in the mine apparently fought bare-headed. While it is possible that, in this case, shortage of evidence from Dura really is evidence of limited presence, it seems unlikely. On the one hand, it is more plausible that the major deposits of well-preserved material (especially Tower 19 and its countermine) happened not to include helmets, partly by chance (see above) and partly due to special circumstances: in the mine fighting, the restricted head room may have made impracticable the wearing of helmets, especially of the contemporary Roman type which did not allow the head to be much raised, essential for a crouching soldier to see ahead. On the other hand, as we have seen, in the town interior we would not expect to find many, if any, helmets due to the high likelihood of their being removed by the victors or, if buried, the strong possibility of their total disintegration, especially if made of iron. Similar considerations probably explain the apparent near-absence of spearheads (p. 188).

To conclude, these observations highlight the considerable difficulties which surround attempts to analyse the composition of the assemblage, especially in seeking to identify any meanings behind relative numbers of survivals of different types of artefact, and above all in interpreting apparent absences from the collection of items which might be expected to be present on the basis of contemporaneous assemblages found elsewhere. Any conclusions about these issues need to be drawn with great circumspection.

Attribution of the material

During the present study it was of course intended, as far as possible, to attribute the material to the combatant forces, to gain an appreciation of the arms of the Roman defenders and perhaps of the Persian attackers. It was planned that this separation would be achieved where feasible on stratigraphic grounds, and in part this has proved possible. However, most pieces lack useful contextual information, and in these cases attempts at attribution have had to be made on typological and stylistic grounds. The results, and problems encountered with this, are outlined below.

CONTEXTUAL INFORMATION

Very little material comes from stratified contexts demonstrably earlier than the preparations for the siege, apart from some arrowheads in the necropolis (e.g. **688–690**, **708–710**). Most stratified material belongs to the phase of preparations for the siege (the shields in the rampart, **616–619**), or was deposited during the fighting itself (notably the Tower 19 countermine assemblage, and the contents of the tower itself: pp. 34–8).

This contextual information allows us to say that the shields under the rampart and the contents of Tower 19 belong securely to the Roman side, as they were deposited in contexts not accessible at the time to the Persian attackers (apart from the small possibility of projectiles shot into Tower 19 becoming incorporated into the collapse debris). More ambiguous is the material from the underlying Tower 19 countermine which, as the scene of a fight, seems to be a 'culturally mixed' context. On detailed spatial grounds, and upon consideration of the artefacts, a hypothetical division between Roman and Persian material can be postulated, but this is far from unambiguous, as a consideration of Figs 13 and 15 will reveal. The tangle of skeletons and artefacts at the eastern end is plausibly entirely Roman in content, from the Roman coins and familiar Roman military artefacts among the bodies. The physical isolation of the supine skeleton, his location 'facing' the city from near the Persian mine gallery, the neck-pendant and perhaps exotic detailing of his armour make identification as a soldier of the Persian side probable, but not certain. Between this skeleton and the pile of Roman dead lay items including the iron helmet and jade sword pommel, which stand out as alien to the familiar Roman material, and which are therefore ascribed to the 'Persian' side. However, in crude spatial terms these items are closer to the Roman dead, and indeed a Roman fibula lay between them and their putative owner. Their identification as belonging to the attacking side is really on typological, more than stratigraphic or spatial grounds.

Other material comes from contexts which may have been accessible to the attackers as well as the defenders before they were sealed. For instance, the items recovered from the rooms of the Palmyrene Gate may well have been disturbed, rifled, or added to after the fall of the city. Many items are not provenanced at all. In these cases, attribution has to be attempted on typological grounds.

As we have seen, even without any specific stratigraphic data for so many pieces, the probability is that most were deposited around the time of the siege; such quantities

of small-finds are not normally incorporated into the archaeological record like this in the East. From the nature of the site – a battlefield, lost to the Romans and soon abandoned to significant settlement – we might expect *a priori* that most of the remains will have belonged to the defeated Roman defenders.

Typological attributions

Although much of the assemblage proved to be lacking in satisfactory provenance, it was still hoped to assign most of it to a cultural affiliation, through typological comparison with parallel material from the Roman empire on the one hand and from the Partho-Sasanian world on the other. This has to a fair extent proved possible. Much of the material may indeed be identified quite securely as Roman because of the existence of parallels, close and often perfect in terms of form (e.g. many of the helmet fragments) and often decoration (e.g. sword fittings), from Roman military sites in Europe and North Africa. Even so, the overall picture has proved to be more complex, and indeed interesting, than initially anticipated.

However, there is a fundamental problem dogging the comparative approach at Dura: the extreme poverty of comparative archaeological data for the martial material culture of Syria, Mesopotamia and the Partho-Sasanian world, especially in contrast to the relative riches of data from the western Roman empire. There are some known finds, although these are rarely well dated, and the problem is ameliorated somewhat by the existence of traditions of representation from Palmyra, to Dura itself, Hatra and Iran. Nonetheless, for the whole of Western Asia we have nothing like the depth of knowledge of composition of assemblages and variation of types, or the relatively fine chronological control, which we possess for European Roman material. This causes serious problems and potential dangers, not least the temptation to assume that certain artefacts types or styles attested in Roman use in Europe were *only* in Roman use, whereas they may actually have been employed on both sides of the Euphrates, and may even have originated in Western Asia, where they are not archaeologically attested – yet.

Against a background of general consistency with known contemporary Roman provincial military practice, a number of Durene objects stand out strongly as 'intrusive', wholly alien pieces. These include the jade pommel **532** and 'Sasanian' helmet **371**, which are best ascribed to the attackers. There are further pieces which are not part of the *known* Roman repertoire, such as the wood-and-hide shields **635** to **638**. Are they therefore Sasanian? The wood and hide shields also illustrate another general problem in attributing the Dura finds. The general extreme rarity elsewhere of survival of organic remains like these shields, or the leather armour, reed arrow shafts or wooden bolts which survive at Dura makes it impossible for us to assess whether the Durene material is local to the Euphrates, or attests otherwise vanished patterns of usage spanning the Roman empire, the Iranian world, or all or parts of both. In the absence of archaeological correlates, attribution is impossible unless highly detailed and unambiguous documentary or representational evidence can help out. For most of the material in question such information is absent or inadequate. However, there is representational evidence for the wood-and-hide shields, which shows that this technique of shield manufacture was ancient, widespread across Asia, and especially well-established in the Mesopotamian region (p. 169). Even so, it remains unclear whether at Dura they were used by one side, the other, or possibly both; and if used by the Roman defenders, whether they were routine equipment, or perhaps local types adopted specifically for use in siege warfare.

At Dura then, especially in the absence of detailed knowledge of the wider contexts of Eastern Roman, local Mesopotamian or Partho-Sasanian repertoires and practices, we must be alert to a range of possible interpretations for items which appear to be unfamiliar. Some may represent unprecedented survival of equipment used across the whole Roman empire (e.g. the wooden shafts which go with the far more commonly found iron tips of artillery projectiles). Others may constitute some of the first archaeological testimony for non-Roman traditions, which may be defined as Partho-Sasanian and/or regional, indigenous Syro-Mesopotamian in nature.

These observations raise a more fundamental question; such attempts at attribution implicitly assume that, between the empires and cultural groupings attested at Dura, there were clear cultural distinctions in martial material culture for us to trace. But was this really true? What if, to any significant degree, two or more groups used the same or similar military material culture? There are reasons, both general and specific to the context, why we might actually expect a considerable degree of 'blurring' and 'cross-over', and these are discussed below.

Nevertheless, we may at least outline some observations about the attribution of the Durene material, with the caveat that many of these remain provisional, and that some may need to be revised, perhaps substantially, in the light of new data from Dura and elsewhere in the Middle East.

Attribution: provisional conclusions

In general terms, we can conclude that the bulk of the assemblage does represent the debris of the defenders, overwhelmingly material deposited in the context of precautions against the anticipated siege, the fighting itself, and the sack of the city which followed it. A small number of items are certainly or probably from earlier phases of the life of the city. Another small number of pieces are fairly certainly attributable to the attackers, so few that it is not possible to say much regarding a Sasanian 'sub-assemblage', although some observations can be made. Others are quite ambiguous in cultural affiliation. It is also possible, but unlikely, that a few pieces could have been deposited after the abandonment of the town.

Material thought to predate the Roman annexation

On typological grounds, some of the copper alloy arrowheads are Bronze Age or early Iron Age. Others, and perhaps the fragmentary Greek sword **523**, seem to be the only testimony in the collection for the military activities of the Hellenistic colonists.

During the generations of Parthian rule Dura seems to have seen little military activity until Trajan's invasion, with no direct trace of any direct Parthian military presence. Dura largely governed itself, and its defences were allowed to decay. How far its still nominally Greek social elite pursued the profession

of arms as individuals or as a city militia is unclear; representations from the town, often poorly dated, seem to show that horse and bow were the established tools of war and the hunt by the second century AD, and Iranian equestrian costume and equipment was widely employed, as was commonplace across the region (Plate 5 and Fig. 17:A).

The Palmyrene mercenary policing force based in the city in late Parthian times has likewise left no traces, unless the group of Roman-style 'Aucissa' brooches belonged to them. Palmyrenes do seem to have used other Roman-style equipment such as swords; at least, in the first century AD they depicted their gods wearing them (Colledge 1976, pl. 35; Dentzer and Orthmann 1989, no. 153). The probable early mail-hook **414** or the possible saddle plate of first-century type (**367**) may also have reached Dura this way. Alternatively, these typologically early items of Roman military equipment, and others including **52**, **190** and **191**, could have been directly deposited during the Trajanic occupation of the town *c.*AD 116 (p. 11). Although short-lived, it lasted long enough to see the construction of a triumphal arch (Hopkins 1979, 68).

The middle Roman assemblage and its characteristics

In general composition, the Roman material from Dura seems to correspond well to the pattern known elsewhere in the empire. Museum collections and site assemblages from the provinces provide the intuitive impression that the populations of items of military equipment in use by the Roman armies of the middle imperial period consisted of a fairly well-defined range of types, which are to be found across the entire empire. There was perhaps one dominant basic form of fighting helmet, a couple of types of shield, two or three major designs of body armour, several basic forms of waist-belt, one principal design of sword and baldric, one tunic form, a standard construction for bridle and saddle harness, and so on.

In details of construction and especially of decorative embellishment these basic forms often exhibit a limited range of variation around a small number of common themes. For example, while long swords worn on baldrics were standard, the fittings on these were of various materials and several styles. Scabbard chapes were usually pelta-, box-, or disk-shaped. Belt and harness fittings were often openwork, and frequently embellished with classical motifs like *peltae*, ivy leaves and volutes, or sometimes with La Tène plastic ornament, lettering, or human or animal figures. Such types may have been regional in origin, but outliers are often scattered empire-wide, and some forms became common across much or all of the empire.

Beyond the limited range of common types, a small proportion of Roman military artefact assemblages, at Dura as elsewhere, constitutes a much wider range of more unusual items. On the one hand, these include stylistic alternatives to the standard variants of items like sword or belt fittings, 'exotica' perhaps representing the personal tastes and/or wealth of individual officers and men (e.g. baldric fastener **17**, in silver rather than the usual copper alloy; or the rock crystal sword pommel **531**). On the other hand, there are unusual categories of equipment reflecting the technical needs of specialists, such as the incendiary bolt (**804**).

As with the less common variants of standard items, being of their nature relatively rare if not actually unique in the total population of artefacts at any give site, such special pieces form a 'tail' to the frequency curve where the effects of probability are especially strong in determining whether or not representatives of their numerically-small classes survive into any recorded assemblage.

Many individual items from Dura are wholly typical of Roman military finds elsewhere, e.g. on sites in Europe. There are areas of complete identity, for example in the design of helmets (**372** to **376**), or in the detailed construction of some types of scale armour (e.g. **432**), where the Durene material is quite indistinguishable from that found in the West as far as Scotland. Likewise, with regard to many of the sword fittings, Dura generally fits well with the distinctive Roman repertoire of shapes and decoration seen in these components elsewhere. On the other hand, there are some interesting differences between Dura and the generalized European background, which itself shows some signs of regional variation. Some Durene types, for example, may be paralleled in Danubian contexts, but apparently not in Upper Germany, e.g. **68**, **91** and **133**. Strap terminals like **133** appear to be heavily concentrated in Mauretania, and are probably a local African type. These are perhaps examples of types concentrated regionally but with some distant outliers.

It was noted above that absences of certain familiar categories would also be significant – if they are real, and not due to the chances of preservation determined by the absolute sample size and its ratio to the original artefact population. Some 'gaps' in the recovered assemblage may be judged, at least on present evidence, to represent real absences from the site. A case here would be bone box chapes from Roman swords, relatively very common in Europe: they account for almost 40% of the eighty-four whole and fragmentary chapes listed from Upper Germany by Oldenstein (1976, nos 102–85). At Dura, a substantial sample of chapes has been found, including an iron version of the box type, and bone and ivory examples of other forms. Had the bone box type been present at Dura, in anything like the frequency encountered in Europe, then in a sample of *c.*30 examples we might reasonably expect to have recovered something like five or six examples. There are other interesting apparent absences. Dura has produced no unequivocal 'cavalry sports' helmets (although see the ambiguous **377**) or related armour or horse furniture ('Minerva' chest-plates like **415** to **417** seem now to be standard armour of the period). Were these apparent absences somehow due to the special circumstances of the siege? Were some categories of equipment (such as ceremonial items) evacuated, or never brought to the site by the defending units? Do the patterns indeed relate to regional fashions? Or could rapid diachronic changes be responsible? None of these options can be ruled out at present.

Some of the material is clearly related to, but deviates significantly from, known Roman practice elsewhere. There are several potential explanations for such variation. It may be more apparent than real, due to the incompleteness of the record at other sites. If real, it could represent the eastern Roman military's own, local, self-generated styles or traditions; its adaptations to local conditions or indigenous fashions; or perhaps adaptation of Roman styles by local groups to meet their own needs. Of course, with recruitment of local men into Roman units, these two processes could become inextricably blurred.

An apparent example of simple regional variation in style within standard Roman military equipment types is provided by the group of shield-shaped baldric fasteners, **1** to **4**. These types appear unique to Dura, and may have been provincial, even unit-specific, types at the time. Another apparent example seemed to be the group of star-shaped shield bosses (**603** to **606**), hitherto unknown to me from any other part of the Roman empire. However, two pieces of data, both of which suddenly came to my notice in 1999, completely altered the picture. An archaeological example, very similar in detail to the Dura pieces, is now known from Slovenia (Gaspari 1999); and another is clearly depicted on the shield supporting the leg of the statue of the *genius* of the Roman people in the Farnese collection, Museo Nazionale, Naples (inventory no. 5975), suggesting the type was also familiar in metropolitan circles. A single chance discovery can suddenly alter such pictures. Apparent regional absences of items which may have been numerically small but geographically widespread components of artefact populations are unreliable indicators.

A more general trait which does seem to be a genuine peculiarity of the Eastern provinces is the extent of the use of anthropomorphic decoration on equipment, both in terms of the range of figures represented, and in the range of contexts where they are found. Faces (e.g. **189**) and especially full-length human figures were represented. In these regards, Durene and other Eastern evidence seems to be at variance with practice in the contemporary West. While busts and full-length representations, especially of Minerva (e.g. **417**), are widely seen on certain categories of equipment right across the empire, not least 'cavalry sports' armour, in other contexts they are little seen in Europe. Several items from Dura stand out as unusual against the known contemporary European background, e.g. the breast-plate with a male figure **418**, and the large, full-length figures on 'Warrior God' shield **618** and the strange bossless painted wooden shields **633** and **634**. Other sites in Syria have produced analogous finds. There is an openwork copper alloy *phalera*, probably a baldric fastener, from Tell Barri in Northern Mesopotamia (Peccorella 1987, fig. 50); it bears a male figure wrestling an animal, almost certainly Hercules and the Nemean lion, flanked by a tree and other items probably representing Hercules's bow, quiver, and perhaps a sword (Pecorella 1987, fig. 50). Baldric fasteners displayed in the National Museum, Damascus depict Mithras full-length (numbered 2592/7126), and a half-figure of Jupiter Dolichenus (numbered 7197).

A number of these figured items are elaborate openwork baldric-fasteners. Eastern examples seem to exhibit a wider range of decorative themes than those known from Europe and North Africa, including the unusually elaborate patterned silver example from Dura (**17**), and one from Palestine with lettering mentioning *legio X Fretensis* and showing a military standard (G. Stiebel, pers. comm.). A further example, with lettering mentioning *legio VI Ferrata* and depicting the she-wolf and twins, was found in Egypt (Southern and Dixon 1996, 108, fig. 33).

Last but by no means least, Dura's horse armours **449** to **451** and leather cuisses **441** and **442** may well also be regional specializations of the eastern Roman armies. However, leather armour could have been in widespread Roman use at the time, but is just not preserved in Europe. Or perhaps it has simply not been recognized yet; after all, we have yet to find something so widely used as an intact leather waist-belt.

To conclude, the recognizably Roman components of the assemblage mostly fit very well with the contemporaneous repertoire of types and styles attested elsewhere in the empire, while also exhibiting some interesting, possibly characteristically regional, variations and specializations. Indeed, the Durene data, representational as well as archaeological, significantly strengthens the overall impression that middle imperial Roman martial material culture, while it exhibited some interesting but fairly limited variation, was generally marked by strong underlying empire-wide standardization. In important respects, especially in conformation of soldierly dress and personal equipment fittings, this amounts to effective uniformity and homogeneity from the fringes of the Sahara and the borders of Scotland to the Middle Euphrates. How and why this may have came about is discussed below.

Non-Roman material from the siege period

A quantity of the material is not recognizably Roman. That thought to pre-date the Roman occupation was discussed above. Other items certainly or probably belong to around the time of the destruction of the town. We would expect that, since for much of its history the city was occupied by non-Roman groups, and that it ended its existence as a battlefield, the assemblage of military equipment should contain a proportion of non-Roman items. For example, from the siege, we might expect that some of the arrows and artillery bolts recovered will have been shot into the city by the attackers; it is clear from the sophistication of the siegeworks, and from historical information, that the Persians – or, perhaps more precisely, subject peoples with their own military traditions, notably the then recently conquered Hatrenes – were well versed in military technologies including the manufacture and use of torsion artillery.

Most obviously anomalous in an assemblage which looks fundamentally Roman are the iron helmet, jade sword pommel and mail shirt from the Tower 19 countermine which appear to be the panoply of a 'Persian' (p. 37). Helmet **371** is clearly not a known Roman type, and as I have argued in detail elsewhere (James 1986a), is demonstrably part of a Near Eastern tradition. There is no reason to doubt that it belonged to one of the attackers. Likewise, the jade pommel found with it (**532**) is alien to the Roman world in both its exotic material and its form. Mail shirt **379**, found on the isolated skeleton nearby, is also of considerable interest in its detailing. Whereas the Roman mail shirts seem to approximate the form of the Roman tunic, this shirt reflects the cut and decor of the Parthian *kaftan*, with side-splits and long sleeves, and imitates in rows of copper alloy rings the trimming along lower edges and at the neck and cuffs seen on such garments (Schmidt-Colinet *et al*. 2000, fig. 34). It also bears an un-Roman-looking 'heraldic' device on the chest.

Other pieces which seem not to belong to the Roman repertoire include **582**, the iron box chape; Roman examples are in bone (see above). Chapes of this general form are seen on Sasanian rock-carvings (Fig. 26:A and B). Another edged weapon of non-Roman form is represented by the 'scimitar' hilt guard, **529**.

Can we simply label these alien items as 'Partho-Sasanian'? The items from the Tower 19 countermine seem obvious

candidates, on grounds both of context and typology. But how useful is it to do so? Such a label may be taken to imply that there was a single clearly definable 'Partho-Sasanian martial material culture' comparable to that of the Roman world. However, we may wonder how far, in reality, the city states, kingdoms and tribal societies of the empire shared such a feature. While, as will be discussed, Roman martial material culture is demonstrably fairly homogenous – indeed, in many aspects remarkably strongly so – that from the Partho-Sasanian side is very little known, but on historical grounds it may be anticipated that it was inherently much more heterogeneous. The Partho-Sasanian world has always been regarded as internally highly diverse in ethnicity and culture. Parthian and Persian royal armies were not homogeneous, but might consist of contingents from all parts of the empire, from Central Asia to Mesopotamia (Frye 1983, 154; Lukonin 1983). The army which besieged Dura is likely to have included contingents from the nearby western satrapies, and perhaps groups from the far eastern and northern fringes of the Sasanian world, as well as the Iranian heartland. It certainly included groups with access to jade (**532**). While martial traditions based around horse-archery and armoured cavalry may have been very widespread, probably constituting norms, a wide range of local traditions and styles of martial equipment might be expected within such Partho-Sasanian armies. Consequently, in our current state of knowledge, meaningfully labelling military artefacts 'Partho-Sasanian' remains problematic, especially around the western fringes of the Iranian empire, where polities from Armenia to north Arabia maintained their own distinctive cultures and martial traditions which might appear on either side of the battlefield at different times. How useful would it be, for example, to label as 'Partho-Sasanian' the equipment of (say) Hatrenes, former Roman allies, pressed into Sasanian service after the fall of their city?

Examples of equipment which illustrate the cultural complexities of the region, and the difficulties of attribution, are provided by the wood and rawhide shields (**635**–**638**). Alien to the known Roman equipment repertoire, they are, as discussed above, certainly derived from a tradition long established in the Middle East and across Central Asia. Are they therefore to be assigned to the attackers? Caution is called for here: such local-style shields could well have been used by both sides; the larger sizes especially could have been useful to both Roman defenders and Persian attackers in siege fighting. These shields are actually just one of a number of categories of material at Dura which turn out to be very hard to attribute to any one cultural grouping active at the city, before or during the siege. Another ambiguous form is the bossless oval shield (**633** and **634**), which may be a derivative of a local type (p. 169), although the close similarity of the decoration to the more standard Roman shields suggests that this form was in Roman use – or perhaps in the hands of Romanizing allies such as Palmyrenes. It was noted above (p. 25) that the presence of a Palmyrene allied contingent among the defenders at Dura is quite feasible.

Items of uncertain attribution, possibly used by both sides

Other items from Dura, besides the wood and rawhide shields, were also possibly or probably used by both attackers and defenders. It is noteworthy, for example, that it is not possible to identify clearly typological differences, which might be ascribed to the two combatant sides, among the iron arrowheads recovered. Since arrows and artillery projectiles were almost certainly flying in and out of the city in great numbers during the siege, we might expect the surviving examples to represent both sides. The three-bladed, barbed and tanged head was universal from Scotland to Iran at this period. The group from Tomb 24 in the necropolis (**688**–**690**, **708**–**710**), probably representing non-Roman, local Durene practice, are not generally distinguishable from the majority of those found in the town and its defences, which are presumably mostly Roman with some Sasanian pieces.

Similarly, the iron bolt heads cannot be clearly assigned to the combatants on typological grounds. All are of types attested elsewhere in the Roman empire, even though some must almost certainly be pieces shot in by the attackers. Much the same conclusion applies to the wooden bolt shafts. There is some variation in style of manufacture, although it is not at all clear that these correspond to cultural distinctions. It may be that both sides were using closely similar, if not identical, machines and ammunition. This would not be surprising if the Persian army was employing captured Roman artillery pieces, or machines and indeed artillerymen acquired in places like Hatra, which had exhibited great expertise in this area before it fell to the Sasanians. Analysis of wooden bolt length suggests, although it does not prove, that a single set of incremental modules was used for all the wooden bolts surviving from the town, which would be consistent with artillery design and practices being common to both sides at the time.

These observations point to the conclusion that, while the overall composition and detailed appearance of Roman and Sasanian military panoplies may have been distinctly different (helmet design being perhaps the most obvious), the typological boundaries between them were probably much less sharply defined than in modern armies. Such may have been especially true of less personalized items like artillery ammunition, but could have extended to commonality in some details of clothing, armour and personal weapons. This would be unsurprising among contingents who, at one time or another, served both empires (e.g. Palmyrenes, former Hatrenes or indeed Durenes themselves), but in some degree could well have applied to 'mainstream' Roman and Iranian soldiers as well.

Such a conclusion demands a reappraisal of some basic, commonly made, implicit assumptions regarding the cultural identification of martial material culture, which have been left unchallenged until this point.

Cultural distinctiveness, interaction, convergence and identity in martial material culture

The blurring of cultural boundaries in military equipment and practices

> Given time, the fighting itself will cause the two sides to become more like each other, even to the point where opposites converge, merge, and change places . . . The principal reason behind this phenomenon is that war represents perhaps the most imitative activity known to man.
>
> (Van Crefeld 1991, 174)

In drawing up the original research questions, the key implicit assumption was made that we would be able clearly and simply

to distinguish between the military equipment repertoires of the several cultural groupings attested at Dura, i.e. the Roman garrison, the Persian besiegers, the earlier Hellenistic Greek presence, and indigenous regional societies. As we have seen, this has proved difficult in many cases, partly due to lack of preservation of comparable material within the Roman empire (especially organic items), and more general ignorance of martial material culture from beyond Rome's eastern frontiers. However, as we have also seen, other items do seem to be inherently ambiguous with regard to cultural attribution. This situation demands a general consideration of the issues of cultural identity and boundedness and, more specifically, of the degree to which military artefacts may be seen as unambiguously identifiable cultural markers of one particular society under arms rather than another.

To begin with, contemporary documentary sources and visual representations suggest that Romans, Partho-Sasanians and others under arms were normally readily distinguishable and mutually recognizable, as is evident from an interesting passage in one of Cicero's letters: 'As for your question about the Parthians, I do not think there *were* any Parthians. There were Arabs, some of them with Parthian equipment . . .' (Cicero, *Letters to his Friends*, 3.8, 51 BC: Penguin trans.). This passage suggests that there were indeed recognizable 'national' distinctions in styles and traditions of martial dress and equipment. However, significantly, it also suggests that the boundaries between them were permeable; types, styles and even entire 'packages' of equipment could be transferred across ethnic and political boundaries. This is an important point to which we will return.

Less overtly, modern expectations of clear 'ethnic' distinctiveness between ancient military material cultures is based on an implicit analogy generalizing from recent armies. We widely see obvious, highly systematic differences in uniform and equipment between modern armies, themselves institutions of nation-states. Before World War II, for example, there was hardly any commonality of specific types of arms or equipment between the militaries of, say, Britain, France, Germany, Italy, the United States, Russia or Japan. In terms of their military material culture they were unambiguously distinctive, and it is easy to assume that the same would have been generally true of ancient armies as well.

All this notwithstanding, when thinking about ancient armies there is ample reason to treat with caution the impression given by the ancient documentary sources and visual representations, and the analogy with modern armies. For example, we have reason to suspect that contemporary Roman and Partho-Sasanian visual representations (mostly on bas-reliefs) exaggerate the material distinctiveness of the two sides. These primarily depict leading figures like shahs and nobles, emperors and Roman officers (all seen together in key monuments like Bishapur II: Herrmann 1983). Such individuals might be expected to ensure emphasis of their visual distinctiveness in reality; we might also expect that when they commissioned representations they demanded very clear, and perhaps exaggerated visual distinctiveness of figures to ensure that the scenes were 'read' clearly. Exaggeration or distortion could also arise from artisans following the visual conventions of particular representational traditions (pp. 43–6).

With regard to the modern military analogy, Antiquity was obviously very different from our world. Neither the Roman empire, the Parthian state nor the Neo-Persian empire which followed it were anything like modern nation-states. Their armed forces were not organized like modern regular armies (including the Roman military, which commonly used self-equipped allies). Nor were they equipped with standardized, regulated, mass-produced, industrially-made items. And in any case, a moment's reflection shows that the idea that twentieth-century armies are always clearly distinguishable in their 'material culture' is itself a gross oversimplification. Many poorer states have been equipped by powerful allies or colonial masters, so that, for example, the army of newly-independent India was in large measure equipped with British dress and weapons, while during the 1960s that of South Vietnam used American equipment, and North Vietnamese forces largely used Russian *matériel*. Even in our world, then, military artefacts are often ambiguous in cultural meaning or national/ethnic attribution.

The uncertainties of cultural attribution of military equipment, modern or ancient, provide an excellent illustration of wider themes in contemporary archaeology, especially the establishment that artefacts – whether pots, brooches, boots or swords – carry no innate, unambiguous cultural meanings with regard to 'ethnic' or 'national' identity or any other affiliation. All artefacts are used by people engaged in a matrix of multiple identities which include ethnic, status, gender, age, religious, occupational and other dimensions. Moreover, these identities are not fixed and sharply-bounded, but are shifting and often quite ill-defined, even in modern nation-states. Research on how identity actually works shows that it is not a *thing* which can be simply manifested in an artefact, but is a *process* of repeated re-affirmation and negotiation, involving gradual or rapid change (Jones 1997; Gardner 2001). The use of artefacts and other symbols is very important in developing, expressing and living out identities, but the meanings – often multiple – ascribed to them depend on the immediate context: the same artefact shifts meanings if used in different ways and places and times, even if used by the same people.

A telling twenty-first-century military example of this fluidity in the cultural meanings of artefacts is provided by the 'Kalashnikov assault rifle' (actually a family of closely related designs: Ezell 1986). Originally of 1940s Soviet design but subsequently made in several countries, this icon of communist revolution is currently in near-global use, and sold by capitalist arms merchants to armies, irregulars and private individuals: one of the site guardians at Dura proudly sported a newly-acquired example in 2001. In contexts like this, or in the hands of Islamic fundamentalist militiamen in Afghanistan, its Soviet origins and any supposed simple inherent ethnic/national attribution or 'cultural meaning' as 'Soviet' or 'Russian' are far from obvious. There are other instructive modern examples of this malleability of meaning according to use(r) of martial material culture, from the donning of 'government surplus' combat jackets for fieldwork by modern archaeologists (I have used British, US and Italian examples myself), to the wearing of items of ceremonial uniform as ironic fashion statements by civilians, both male and female, since the 1960s. In these examples, martial artefacts change their original meanings, sometimes continuing to be bound up with

martiality and masculinity, but changing or losing entirely their particular 'ethnic'/national affiliation, sometimes being consciously and deliberately 'subverted' in all respects.

Similar complexity of meaning and fluidity and transformation of use of martial material culture may be observed in Antiquity. What we might label 'Roman military dress and armament', when worn by a Roman soldier, could be involved in making visual and physical statements about his masculinity, occupation, social status, political and ethnic identity and, through the common representation of gods and myths on arms and fittings, even his religious affiliation. But what happened if these same 'Roman military artefacts' were acquired and used by others for different purposes? What if, say, Palmyrenes adopted the standard early imperial Roman infantry sword, the *gladius Hispaniensis*, as their own, as they may well have done (p. 240)? This weapon was itself of Spanish origin: in Palmyrene use, how much sense does it make to call it 'Roman' rather than 'Palmyrene' or even 'Spanish'?

All this reflects the general *potential* fluidity of meaning of items of military dress and equipment, according to who uses them, and in which specific context. However, the material from Dura-Europos also comes from an especially complex regional cultural and historical context, which comprised far more than a simple interaction between two, internally homogeneous polities. As already observed, the two empires were not modern nation-states with fixed and stable borders; when Dura fell, the boundary zone between them in which the city lay had been highly unstable for decades. Neither were they internally culturally homogeneous; quite the reverse. Each side incorporated enormous cultural and ethnic diversity, including many communities (from Armenia to Hatra, Dura itself and Palmyra) which engaged with both sides or changed imperial master, sometimes more than once.

Where the Roman and Partho-Sasanian worlds clashed, as exemplified by the archaeology of Dura, there are good reasons, then, to expect that there would *not* be a sharp, clear distinction within the assemblage between Roman and Partho-Sasanian military equipment – at least not in all aspects. Further, we are dealing with the material culture of warfare, which Martin Van Crefeld (above) has described as one of the most imitative of all human activities, even for modern armies.

Even without arms trading, it seems to be a commonplace fact of military life and warfare today that equipment changes hands between armies; the same was true in Antiquity. Soldiers acquire novel items from allies and enemies alike, whether through voluntary exchange, theft or looting. Such transferred items, or local adaptations of them, may become permanently integrated into the military material culture of the recipient society. However, although such exchanges between cultures are common, the degree, rate and extent of borrowing are highly variable.

Likely reasons for this widespread two-stage process are easy to identify. Soldiers procure alien equipment for a variety of reasons, not the least of which may be simple necessity. In the case of poorer soldiers responsible for equipping themselves, there may be no option but to seize whatever the fortune of war brings in the form of loot or salvage: as Herodian commented of Sasanian Persian armies, 'At the end of the war each [soldier] returns to his regular occupation, taking as his pay whatever falls to his lot from the general booty' (Herodian 6.5.3).

Exchanges may also occur as a result of witnessing the functional superiority of aspects of enemy technology or practice, in anything from artillery to footwear. To cite one small illustration, during the Falklands/Malvinas War of 1982, British soldiers looted boots from Argentinian prisoners because they were far better adapted to the cold, boggy terrain than British official issue (McGowan and Hands 1983, 286–7). In Antiquity, and on a far broader scale, similar 'borrowings' of martial technology and practices arose from encounters with the unfamiliar and impressive, such as early Roman exposure to the effectiveness of Asiatic massed horse-archery and, probably, Iranian experience of Western torsion artillery.

However, less tangible factors may be of equal or even greater importance than functionality in driving such exchanges. These range from simple human curiosity and attraction to novelty, to issues of prestige: exotic foreign items inherently draw attention, especially if they carry associations of power and success drawn from witnessing their use by their original owners (allies or enemies) on the battlefield.

Foreign military artefacts, practices, traits or styles, initially picked up as front-line soldierly practices or fashions, may become permanently adopted as integral parts of that society's martial culture, reproduced and to varying degrees adapted to local needs. Such emulations may involve anything from a single weapon type, design or style to an entire 'tactical package' of dress and equipment, fighting style, tactics and unit organization. There are, for example, striking similarities (notably in overall form, innovative ammunition design and use of pressed steel components), between the Soviet AK47 'Kalashnikov' rifle and slightly earlier Second World War German assault rifles like the MKb42. Although direct imitation is undocumented (Ezell 1986, 98), the similarities are so close that they can surely be attributed to mutual influence and 'convergent evolution' of new, effective weapon types suitable to the common tactical environment of the Eastern Front. Similarly, the German Pzkpfw V Panther tank was a response to, and in its sloping armour a partial copy of, the famous Soviet T-34 (Ogorkiewicz 1960, 215–16). In Antiquity, we can see similar processes of mutual emulation underway between Roman and Partho-Sasanian helmet designs (pp. 101, 103).

An excellent example of military imitation and adaptation of an entire 'tactical package', driven by symbolic associations of power and prestige as much as functional effectiveness, is provided by the 'craze' for units of Hussars in early modern European armies. The fame of the original Hussars, tough Hungarian light cavalry, led to the establishment of imitation regiments across eighteenth-century Europe, the details of the Hussar uniform being copied and elaborated in increasingly gorgeous and impractical ways (Abler 1999, 23–46).

The Roman republican armies' adoption of the murderous Spanish sword, the *gladius Hispaniensis* (as it is known: Bishop and Coulston 1993, 53), constitutes an ancient case of mixed motivations in imitating foreign martial material culture. Functionality was surely a key factor here; it was a fearsomely effective weapon. However, the adoption along with the sword

of its ring-suspended metal-framed scabbard and plated belt was not a functional necessity. Other, less tangible factors must explain this. It is likely that the sheathed weapon was most easily recognized, and its warlike prestige and the Spanish associations of its ethnically-specific name best evoked, if it were seen in its 'proper' scabbard on the 'correct', 'ethnic' belt.

The case of the *gladius Hispaniensis* illustrates something more than that Roman soldiers followed the common military tendency to copy the ways of feared foes or respected allies. Rome was actually unusual in the extent to which she pursued such martial borrowings. This was a perhaps under-appreciated aspect of her more general openness to foreign cultural influence. Willingness to borrow ideas, practices and material culture from other cultures, to a degree remarkable by comparison with other peoples such as the Greeks, was one of the most striking and enduring characteristics of Roman civilization. This cultural trait makes the Roman empire, seen in interaction with the polities around her borders, an especially good context for examining the martial facet of such processes of interchange and emulation, which in the case of Rome is also unusually well-documented in terms of texts, representations and not least direct archaeology. Within this, Dura in particular provides an especially informative focus of study, as a major archaeological assemblage from the middle of (it will be argued) one of the most important zones of interaction between Rome and her neighbours.

Probably because of their non-exclusive ideology, which was underpinned by multi-ethnic origin myths, the Romans adopted and adapted a huge range of practices and material culture, both civil and military, from many societies. These cultural imports were, to varying degrees, refunctionalized and incorporated into Roman life, and given new meanings which integrated them into Roman culture and identity. This process of co-opting, refunctionalizing, revaluing and/or relabelling elements of existing cultures to constitute parts of a new one may be called cultural *bricolage*. An idea taken from the anthropology of Claude Lévi-Strauss (1966, 16–36), and reworked by Terrenato as a framework for understanding the development of civil, and especially elite Roman culture in republican Italy (1998), the concept of *bricolage* provides an extremely powerful tool for understanding the nature of the wider Roman empire. It is equally valuable for thinking about martial culture, not least that of the Roman military.

It was not just the sword, but many other items of early imperial Roman arms and armour which were adaptations of foreign artefacts: in addition to a sword, dagger and belt(s) of Spanish origin, the legionary of the first century AD also commonly wore an iron helmet of Gallic inspiration, and body armour probably adapted from Hellenistic/Asiatic cavalry armour (the so-called *lorica segmentata*: see below). The elements were adapted and integrated into the legionary's panoply and relabelled as Roman, constituting a neat example of a process of *bricolage* which took place during the later republic and Augustan period. It will be argued below that another subsequent episode of *bricolage* resulted in the very different repertoire of equipment seen at Dura and right across the empire in the third century AD. As will be seen, this *bricolage* incorporated artefact styles, types and associated practices drawn from the cultures beyond more than one frontier, and there is also evidence for Roman influence travelling in the opposite direction.

Cultural distinctions, commonalities and military material culture exchanges at Dura

At sites like Dura, then, we might expect military archaeological remains to reflect a complex picture of several differing cultural traditions, which were also engaging in processes of convergence, imitation and exchange of martial practices and material culture. On examination, the evidence suggests that we can see contributions from the Hellenistic world which founded Dura, and from the local Syro-Mesopotamian cultural region which was bisected by the Roman/Partho-Sasanian frontier zone, as well as the Roman and Iranian imperial traditions.

The specific local mechanisms facilitating interchange in all directions between these traditions are also fairly simple to imagine. Huge quantities of military equipment will have changed hands in both directions, as a result of major battles from Carrhae in 53 BC to Barballisus *c.*AD 253 (and soon after the fall of Dura, Edessa), of successful sieges like those conducted by the Persians at Hatra and then Dura itself, and of the repeated Roman invasions of Parthia and sackings of Ctesiphon. Perhaps even more influential in cultural transmission were individual soldiers and military contingents crossing frontiers, or polities finding themselves under new rulers; for example, Palmyrenes, Hatrenes and Durenes served both the Roman and Iranian empires at different times, and sometimes simultaneously. Soldiers, undoubtedly with their equipment, crossed the imperial frontier in both directions: willingly as exiles, mercenaries, recruits to regular service or fleeing deserters; or unwillingly as prisoners of war (Ball 2000, 114–23).

Considerable numbers of political exiles fled into Roman territory to escape from trouble encountered in the turbulent politics of the Partho-Sasanian world. Sometimes they arrived as substantial bodies of men; for example, Zamaris, a Babylonian Jewish noble under the Arsacid regime, fled to Roman protection in Antioch with 500 horse archers and 100 kinsmen (Kennedy 1996c, 84; Josephus, *Ant. J.* 17.2.3). A major mechanism for the entry of foreign ways into Roman service was the recruitment of contingents of foreign soldiers as 'ethnic' auxilia, with their own styles of equipment and traditions, some of which became incorporated into the Roman milieu. Groups like the retinue of Zamaris are likely to have formed the basis of the known Parthian and, later, Persian 'ethnic' units in Roman service (Kennedy 1977).

The largely *ad hoc* and multi-ethnic nature of Partho-Sasanian armies made them of their nature culturally very mixed, and open to incorporating Greco-Roman ways, especially via the recruitment of contingents and mercenaries from the western satrapies: if called upon to provide troops, the self-consciously Greek social elite of Parthian-ruled Dura, for example, may well have helped to maintain some Hellenistic influence in Parthian royal armies, while Roman-influenced Palmyra provided Parthian kings with mercenaries. There were also more direct peaceful routes whereby Roman martial culture could have moved east: there is a possibility that among the foreigners serving in Parthian armies for pay (Widengren 1976, 287) were Romans, enlisted

prisoners, deserters or political exiles and 'renegades' from Q. Labienus in the first century BC to Antoninus in the fourth century AD (Ball 2000, 14; Lieu 1986, 491–5).

Under these circumstances, we may expect that all the groups who may have been represented at Dura were quite frequently in contact with 'foreign' equipment, faced on the battlefield, subsequently taken from the dead or from prisoners, or observed in the hands of foreign allies, mercenaries or recruits. As argued above, soldiers may either have reused captured items directly (complex and expensive ironwork like mail, helmets or sword-blades would not be lightly discarded by poorer soldiers or warriors lucky enough to acquire them), or perhaps adopted or imitated attractive aspects of alien equipment and practices, which would thereby become incorporated into the wider martial culture of the host army.

Mutual imitation between Rome and Iran can clearly be seen in the case of helmets. I believe that the riveted reinforcing ridge on the front of Dura's 'Persian' helmet **371** is evidence for the influence of early imperial Roman helmet design on mid-third-century Eastern practice. Conversely, Sasanian helmets of this very type then inspired the revolutionary new style of Roman helmet which appear a few decades after the fall of Dura (James 1986a, 128–34). A similar case of Western influence on Iran is the Partho-Sasanian adoption of iron mail, almost certainly a European invention, apparently seen in Persian use at Dura (**379**) and certainly seen on near-contemporary Sasanian rock-carvings (e.g. Firuzabad: Curtis 2000, pl. 13). One or two archaeological examples of Roman martial material culture are actually known from within the Partho-Sasanian world. A decorative plate from a Roman scale shirt like **415** was found in Iran, at Masjid-i Solaiman (Ghirshman 1971, 174, pl. IIIa). A Roman-style, if not Roman, dagger in iron, with an openwork, ring-mounted scabbard, was found in a Parthian-period grave east of the Euphrates, at Tell Schech Hamad, Syria (first century BC or first century AD; Künzl 1998). A number of Roman brooches, themselves probably largely from military use, are also known from Iran (Ghirshman 1964a, 101–7).

Syrian Palmyra provides further illustrations of cross-over: its troops served both Rome and Parthia, and its art reflects adoption of Iranian equestrian traditions, although its gods are depicted wearing Roman swords (Colledge 1976, pl. 35; Dentzer and Orthmann 1989, no. 153; on Sasanian equestrian costume, see Goldman 1993).

Directionality of technology transfers is not always easily established, although close similarities suggest such exchanges. A case in point from Dura is the mace-head **647**, clearly corresponding to a type in Roman cavalry use described by Arrian (*Ars tactica* 4.9), but with a good Iranian archaeological parallel: Arab historians record that Sasanian cavalry were also equipped with maces (Inostrancev 1926, 48).

It is consequently not surprising that, at Dura, there are serious difficulties in deciding whether some items, such as for example the wood and rawhide shields, were in use by the Roman defenders or the Sasanian attackers; they may well have been used by both sides, since both armies almost certainly contained troops of local origin amongst whom such equipment was traditional. Convergence and commonality across boundaries in other areas such as the design and manufacture of projectiles probably also explain why it is so hard to identify distinctions among the iron arrow- and bolt-heads at Dura.

Future fieldwork in the Middle East will fill out many details of this picture, better contextualizing Dura and illuminating these patterns of two-way interaction, the details of which are only dimly perceived at present. However, the body of data from Dura, taken with other information from the Middle East and the much more thoroughly-known Roman West, already allows some important provisional conclusions and hypotheses to be set out regarding the impact of Syria, Mesopotamia and Iran on Roman military material culture, something as yet relatively little understood.

The contribution of the East to middle imperial Roman military dress and equipment

Dura has produced a major contribution to the rich body of archaeological, documentary and representational data which is giving us an unusually detailed understanding of ancient martial material culture, primarily the equipment, and most notably the dress, of middle imperial Roman soldiers. This material-cultural repertoire is very different from that worn 150 years earlier by the predecessors of the soldiers of Dura's Roman garrison. This section examines the role of the peoples around and beyond Rome's eastern frontiers in inspiring and influencing middle imperial Roman dress, arms and armour.

Of particular interest is the fact that, while much decorative detail remained identifiably Greco-Roman in origin, in general conformation the dress and equipment of Roman soldiers of the later second and third centuries AD, although of course overtly regarded as 'Roman' at the time, owed almost nothing to the Italian origins of the Roman armies. Well before AD 200, the clean-shaven, bare-limbed legionaries of the later republic (Fig. 140: left) and early empire had given way to bearded soldiers dressed in long-sleeved tunics and long breeches, equipped with the kinds of arms and accoutrements attested at Dura. The changes which were made between roughly AD 130 and 190 in almost every aspect of martial material culture, from clothing and boots to sword types and scabbard designs, methods of horse harness manufacture and shield forms, were so extensive and, by comparison with the more leisurely evolution of preceding generations, so rapid that they have been termed the 'Antonine Revolution' (Bishop and Coulston 1993, 109–21).

Where did the new repertoire of arms, styles and practices come from? Change was a complex process, probably involving a number of sources and forces, and of course an element of continuity. Much middle imperial equipment, including that of legionaries, seems in general terms to constitute development of that of the early imperial, provincially-recruited *auxilia*, e.g. in the form of helmets, an emphasis on mail or scale armour, the use of slashing swords, flattish shields, and thrusting spears rather than heavy javelins, etc.

The soldier's tunic may exemplify the complex mix of continuity and innovation which resulted in the new dress and equipment patterns of the later second century and beyond. The colour of early imperial Roman military tunics is a matter of dispute; they may have been normally or sometimes red, but the evidence is far from clear (Bishop and Coulston 1993, 100), although during the third century AD they are always shown as white with purple trimming. This visually related Roman

soldiers to other privileged males of the Greco-Roman world, and in this sense represents continuity with Roman tradition; presumably soldiers, at least citizen legionaries, when off duty and 'in civvies', will long have worn the white tunics appropriate to their status as relatively privileged males. However, incorporating this colour scheme into uniform, wearing it with sword and belt in 'camp dress', and probably under full armour as well, was most likely an innovation of the second century. Further, this colour scheme was now being applied to a new type of military tunic, a long-sleeved garment of 'barbarian' form taken from the northern frontiers (see below). The result was a hybrid garment drawing on multiple cultural practices and traditions.

Other traits may have been the result of direct innovation within the armies. A degree of experimentation somewhere, perhaps in the Roman military itself, is certainly implied by the development and introduction of new kinds of arrow-shooting and stone-throwing catapults which appeared during the second and third centuries (Baatz 1978).

Some changes may have been inspired by wider cultural trends, and/or the personal whims of individual emperors. Classical Greek decorative motifs, for example, had long been taken by Rome as her own, and formed much of the basic decorative repertoire for architecture and portable artefacts across the empire. However, middle imperial period military equipment seems to show some signs of a deliberate antiquarianism, a kind of 'Hellenic revival'. For example, the peltate chapes widely seen on Roman swords of the period (e.g. **553** to **565**) may be imitating a type used on Greek hoplite swords of over 500 years earlier (cf. an example from Campovalano, Chieti: Connolly 1977, 35). It seems to me likely that this may be a material echo of the so-called Second Sophistic period of the mid-second century, when there was a renewed interest in Greek culture among the Roman elite (Anderson 1993). It is perhaps no coincidence that during the later second and early third centuries the Greek, or perhaps Macedonian, past was being used for imperial propaganda purposes; it may be reflecting in a general way the importance of the East under the Severi and, in particular, the Alexandrian pretensions of Caracalla and Severus Alexander (Grant 1996, 19, 26, 31–2; Miller 1939, 47). The latter deliberately used his namesake's image in his military campaigning, for which he relabelled some legions as his own 'phalanx' (*Historia Augusta: Severus Alexander* 50.4–5).



Figure 140 Left, Roman military dress of the late republic: a short sleeveless tunic, with bare limbs (tombstone of Minucius, a centurion, from Padua: after Franzoni 1987, pl. 13). This style remained little changed during the first century AD.

Right, a Danubian German from the Column of Marcus Aurelius, showing the style of dress worn by males of standing among many Northern 'barbarian' peoples during the later Iron Age and early Roman periods: long trousers and a long-sleeved tunic, with a cloak fastened at the right shoulder (after Caprino *et al.* 1955). By the third century, Roman military dress conformed to this basic pattern.

However, very many features of the new post-Antonine military equipment can be traced to frontier-provincial or extra-imperial origins, presumably entering Roman usage through the mechanisms of recruitment and appropriation outlined above. This may be seen as a simple extension of the long-standing Roman habit of mixing tradition with the adoption and adaptation of foreign arms and practices discussed above. It constituted a new episode of *bricolage*, as these foreign traits were refunctionalized, and relabelled as Roman. The result is a blend incorporating some continuity of older martial material culture and some elements from contemporary Mediterranean traditions or metropolitan trends, yet it is mostly dominated by formerly alien traits. But where, exactly, did the last come from?

The evidence suggests that many of the new features came from the northern provinces, and especially the Danube frontier. It is striking that the new basic clothing of the Roman soldier of the third century is essentially the same as that worn during the preceding centuries by males (at least privileged males, perhaps those with the right to bear arms) of the northern 'barbarian' peoples, including Gauls, Germans and Danubian peoples: a long-sleeved tunic, long trousers, and a square cloak, the *sagum*. Danubian Germans on the Column of Marcus Aurelius, for example (Fig. 140: right), are little distinguishable in dress from Roman soldiers on tombstones of the early third century AD, and indeed the former may well have been the fathers or grandfathers of some of the latter. By the middle empire, most troops were being recruited from the frontier zones or beyond, from societies in which long garments were very widely worn, in contrast to the Mediterranean tradition of short tunics and exposed limbs. Since even the sons of Italian-born legionaries mostly grew up in the frontier provinces among such societies, in climates to which long sleeves and breeches were better suited, it is easy to understand how there could have been a general shift in soldierly dress to local styles during the second century AD.

Exposure to Danubian provincial culture may also be attested in the adoption of La Tène plastic or 'trumpet' ornaments to embellish openwork metal fittings from horse harness and personal equipment (e.g. **24**, **25**, **27**, **335**). Although commonly (and misleadingly) regarded as 'Celtic', this variant of La Tène ornament was widely used in Pannonia, notably for indigenous horse-harness fittings which provide obvious parallels, and the probable source of inspiration, for the Roman military examples (Barkóczi 1948; Palágyi 1989).

These same cultural processes also provided plausible routes for other foreign martial artefacts, traits and practices to

be imported into Roman use from around or beyond the frontier zones, such as slide-mounted scabbards replacing ring-mounted forms, and slashing swords generally displacing the stab-and-slash *gladius* for infantrymen. This was accompanied by the decline of widespread use of the rectangular *scutum*, probably because it could not be wielded with a slashing sword which would be prone to striking the projecting upper corner of the recurved shield-board. As the *spatha* displaced the *gladius*, so perhaps the broad oval shield displaced the rectangular form; along with the methods and skills with which they were wielded, each combination of weapons probably formed alternative but immiscible integrated 'packages'. Whatever the case, it has been argued that the models adopted for the new types of longsword and scabbard designs were probably drawn from the peoples around and beyond the Danube, some forms perhaps coming ultimately from the Steppes. A clear example of this seems to be provided by widespread Roman adoption of *Ringknaufschwerter*, ring-pommel swords which were certainly widely used by the peoples Rome faced on the Danube (Bishop and Coulston 1993, 111–12). The likelihood that the slide-mounted scabbard also came to Rome by the Danubian route has been suggested (Bishop and Coulston 1993, 112: see below).

Also attested by the end of the second century are entirely new types of waist-belt (the *cingulum* being a key symbolic item of martial dress: p. 60; Fig. 30). These, too, have been seen as being of Danubian inspiration (Coulston 1998, 178). Middle imperial Roman waist- and sword-belts, and horse harness, are often decorated with openwork cast fittings which find no precedent in Roman military usage; however, there are parallels from the Danubian provinces (see above) and beyond, e.g. openwork mounts closely similar to Roman examples, but incorporating Sarmatian *tamga* symbols, are known from the Black Sea region (Treister 1996, 77 and fig. 4). These may be an aspect of wider 'Sarmatization' of Roman equipment (Coulston 2003). Whatever their origin, the archaeologically sudden appearance of these in Roman use in the middle imperial period is almost certainly an example of the importation of a technique and style of manufacture.

Such adoptions into Roman martial usage could be seen as a material correlate of the high importance of the Danube frontier, and of the rising prestige of the Danubian soldiery, the *Illyriciani* who dominated Roman military history from the reign of Severus to the Tetrarchy. However, the Danube was not the only highly active military frontier during the second and third centuries. I would argue that many elements of the 'revolutionized' middle imperial Roman martial material repertoire are at least as likely to have come from the East as from the North.

The influence of the non-Greek East on Roman imperial culture, and especially on the state and the military, is often thought to be largely a phenomenon of the Dominate. Partho-Sasanian and probably other 'Oriental' influences on the Roman state are certainly evident from the era of Diocletian and Constantine when 'Asiatic' pomp and splendour came to dominate imperial dress and ceremonial. They may be seen materially in Roman military equipment, specifically in the all-new Roman helmet types of the early fourth century AD which I have argued, on the basis of Durene evidence (helmet **371**), are demonstrably adaptations of Partho-Sasanian forms (James 1986a). However, I would also argue that 'Oriental' influence across the empire – from Iran but also from Syria and Mesopotamia – was probably already strong in the third century, and even during the second. After all, we can see this historically in the careers of men like Avidius Cassius, and especially in the attainment of the imperial purple by other Syrians during the third century (see below). By their time, 'Oriental' religions had also permeated the empire, some cults originating within the Eastern empire, such as Isis, Jupiter Dolichenus and Christianity, others coming in from the Partho-Sasanian world, notably Mithraism and, from the third century, Manichaeism (Lieu 1992, 93; 1994). The East had already 'risen' before its spectacular but temporary third-century eclipse by the *Illyriciani*.

As we saw above (pp. 3–6, 8) it is still the case that the general significance of the Eastern armies in Roman military history is underestimated in much modern scholarship, although recent work is helping to correct this (e.g. Kennedy 1996a). The Eastern military has been relatively little studied, and has too often been dismissed as inferior to, and therefore of less interest or importance than, the armies of Roman Europe, as Roman metropolitan anti-Asiatic prejudices chimed with implicit or overt modern Orientalism – although this is baseless (Wheeler 1996). However, especially in the period of greatest interest here – the later second and third centuries – it was of major importance in terms of its size (between a fifth and a quarter of Roman troops were stationed in the East: Kennedy 1996c, table 2), and its great activity. Episodically during the second century, and more intensively during the later second and third centuries, many of the most important military campaigns and events took place in the East. As we have seen, warfare results in convergence and exchanges, so we may expect a significant degree of this across Rome's Eastern frontiers.

In the past, some have argued for a major Eastern role in shaping the development of the early and middle imperial Roman military. For example, in 1966 Gabba wrote: 'The gradual building up of units of cavalry and of archers in the Roman auxiliary forces, which can clearly be seen to have come about in the first three centuries of the imperial age, was occasioned . . . above all, by the needs created by . . . war against the Parthians' (Gabba 1966, 51). Nevertheless, while some contributions or innovations largely or wholly of Eastern origin are well-known, they are usually considered to be relatively minor specializations most of which only become important in the later empire. These comprised provision of foot archers, the imitation of Asiatic horse archery units, and of lance-armed, very heavily armoured cavalry (*cataphracti* and *clibanarii*: Eadie 1967; Coulston 1986; Mielczarek 1993).

However, concentration on gross numbers, specialist equipment and unit types masks the possibility that the armies of the East had a less immediately obvious but more pervasive impact on 'ordinary' units of legions and auxilia elsewhere in the empire, through disseminating to them practices and material culture developed on the Euphrates frontier. For example, the evidence from Dura could imply that, by the third century and perhaps considerably earlier, both horse archery and cataphract warfare were much more widely practised by *elements within* many Roman regiments, at least in the East, than the small numbers of specifically named dedicated units would suggest. Dura was home to legionaries and a *cohors equitata*, not even an

ala, yet it has produced extensive evidence for heavy cavalry equipment (albeit with the caveat that the composition of the siege garrison is uncertain: see p. 24). If established in the East, how far may these practices also already have spread to other frontiers?

There are a number of aspects of middle imperial martial material culture for which an Eastern origin can be argued. An early potential example of Eastern influence could be so-called *lorica segmentata*, the famous laminated iron body-armour which is first attested archaeologically during the reign of Augustus. This may well have been a Roman adaptation and reinvention of the limb-armour used by the heavy cavalry of the Hellenistic East and the Parthian world (like **446**; laminated limb defences are depicted on early second-century BC reliefs from Pergamon: Robinson 1975, fig. 127).

A more certain early example of pervasive Eastern influence is the technology of Roman archery – specifically the composite reflex bow. It is well known that this came into Roman use via the eastern Mediterranean. However, the details of archery technique seen at Dura – notably the first attested Roman use of the thumb-ring (pp. 197–8: cf. **652**) – bespeak continued western Asiatic inspiration of Roman practice in the middle imperial period.

It may also be argued that the new kinds of wide-frame catapult which became current in the second century are most likely to have been developed in the East. This was the region where mural defence and siege warfare were most significant at the time, and where Romans, Greeks and others, including the Arab Hatrenes, all maintained traditions of artillery expertise. Syrian expertise in siege warfare is also attested in the *Poliorketika* of the architect Apollodorus of Damascus (*floruit* later first to early second century AD: La Regina 1999).

Another area in which the Eastern armies may have had a significant role to play is the 'Antonine revolution' in more personal items of martial equipment such as soldierly dress and side arms. Like the Danube basin, the East was also a major recruiting ground for the Roman military. Consequently, as on the Danube, new items, styles and practices could have entered Roman usage with the local recruitment of individuals and units, from among Syrians, Mesopotamians and even Parthians. Others may have been adopted from spoils of war. Eastern participation in the evolution of the new middle imperial martial material repertoire would have been aided by the fact that, in some ways, 'Oriental' styles and practices were closer to those of the Northern frontier than either were to those of the Mediterranean. For example, the East was also a region where, for climatic reasons and according to cultural tradition, males did not normally expose their limbs. As in the North, among many Eastern peoples, including the Parthians, males also wore long-sleeved tunics, often with elaborate symbolic waist-belts and long, usually baggy, breeches; a prominent cultural role for equestrianism was another feature of a number of regions in both the northern and eastern frontier zones. While the precise form of middle Roman military dress – long close-fitting trousers, tunic and square cloak – is indeed demonstrably European rather than Asiatic, it would have been more acceptable and comprehensible to soldiers recruited in Asia than the traditional short Italian tunic. The Eastern armies would have been culturally amenable to adopting such dress. Conversely, they would also have been well-placed to make their own contribution to its evolution. If the northern frontiers inspired the form of the garments, the East, it will be argued, was at least an equal partner in development of, if it was not the primary source for, the new kinds of symbolically-charged Roman military waist- and sword-belts. It is suggested that it is no coincidence that the new Roman belts came into existence during the second half of the second century AD, exactly the time when large new areas of the East, including Dura itself, were being fought over and conquered by Rome.

As we saw (pp. 60–2), several new patterns of military waist-belt came into Roman use during the middle empire, with a variety of fastenings including tongued buckles, and ring or frame buckles through which both ends of the belt passed and turned back on themselves for attachment (Fig. 31). Another standard, if not universal feature of the new Roman waist-belts was the draping of at least one end of the strap, once it had passed through the buckle, in a hanging swag. Sometimes, in the case of ring buckles, swags on both sides are shown (Fig. 24:C). Accompanying the new waist-belts was a new style of sword-belt, the front being broad with a long pendant end, and a large plate fitting anchoring a ring behind, to which the other, tapered end of the belt was tied, having passed behind the wearer and through the scabbard slide (Fig. 85). The metal fittings for both belts were usually copper alloy castings, often in openwork forms, sometimes incorporating animal or human motifs. All of these features were new to Roman usage in the second century. It is surely significant that, while some are known among the Danubian peoples, all were in use in the non-Greek East, in Mesopotamia and the Parthian and early Sasanian worlds.

The symbolic importance of the waist-belt was something Rome shared with the Iranian world, and areas under Iranian cultural influence (Ghirshman 1979; Peck 1990). Widengren has argued that in Iran from ancient times the belt was an important physical expression of the link of subordination of a 'vassal' or 'serf' to his lord; that the putting on of a belt was a symbol of the giving of this status, which also marked a man as part of the entourage of a lord or the king (1968, 141–9).

Armed men wearing belts with strap ends extended into visually characteristic hanging swags, usually on both sides, are represented in pre-Sasanian sculpture from Palmyra, Carrhae and Hatra. On Palmyrene sculpture, the waist-belt with hanging swags was current through the second and third centuries (Fig. 26:G). Such swagged belts are also seen on third-century Sasanian reliefs at Bishapur, depicting warriors from somewhere in Sasanian domains (Fig. 26:C and D). Some of the belts represented at Bishapur are furnished with simple ring buckles just like those seen on Roman military tombstones (Figs 24:B to E and G; 25:A, B, D to F; 31:A). It is also significant that Roman ring buckles, especially the type with stud and hook like **39**, find no forerunners in the Roman world, but do have archaeological parallels (albeit not yet properly dated) in Iran and Luristan.

There is some further important archaeological evidence believed to be from Iran, comprising a group of copper alloy openwork plaques bearing human figures, horsemen or animals. These are related to some Roman and Iranian ring buckles in possessing a hook on one side and a stud on the other (Fig. 141:A to C; Ghirshman 1979, 170–6, pls 1–3; two examples in the British Museum, WA 1992–25, 1 and 135126:

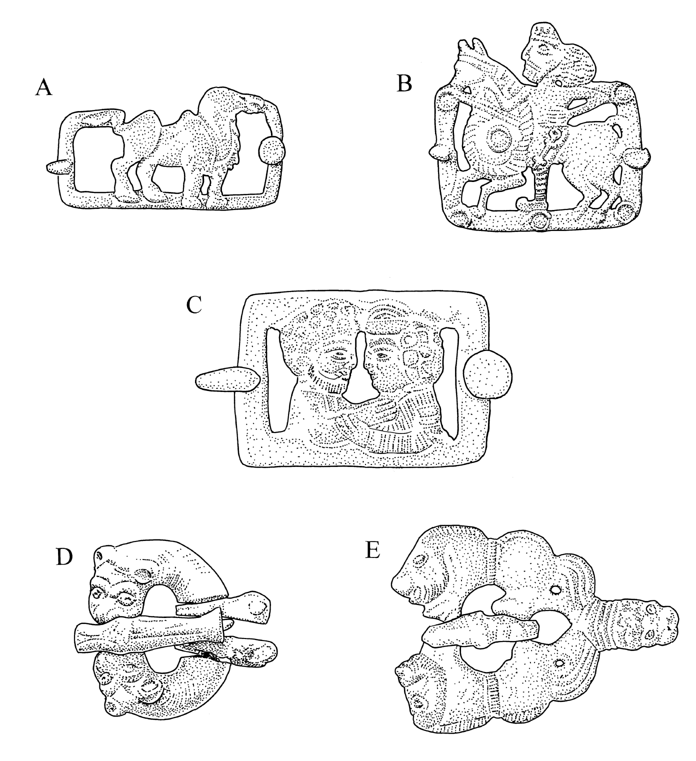


Figure 141 Copper alloy belt buckles probably of Parthian date, unprovenanced but believed to be from Iran:
A Openwork frame buckle with figure of camel (length 87 mm: after Ghirshman 1979, 190, pl. II: 5).
B Openwork frame buckle with mounted figure (length 80 mm: after Ghirshman 1979, 189–90, pl. II: 2).
C Openwork frame buckle with male and female half-figures (length 61 mm: after Ghirshman 1979, 188–9, pl. I: 3).
D Buckle with opposed feline heads on loop (length 60 mm: after Ghirshman 1979, 191, pl. IV: 1).
E Buckle with opposed boar figures on loop (length 78 mm: after Ghirshman 1979, 191–2, pl. IV: 4).

Collon 1995, 194, pl. 159). Ghirshman identified these as components of multi-plate belts (1979, 170–6), but in my view they are clearly a type of frame buckle, with a fixed stud for one end of the belt, and a hook for adjustment on the other, a mechanism seen on some Roman buckles (cf. **39**). Iconographically part of the Parthian milieu, these buckles probably represent the dress of one of the subject, provincial peoples of the Parthian empire. Although without exact context, they are thought to be from South-East Iran, and are probably from graves (St. J. Simpson, pers. comm.). The type is thought, on stylistic grounds, to belong to the later Parthian period, i.e. to the first, second or early third centuries AD (Ghirshman 1979, 171; Collon 1995, 194). This would make them at least contemporary with, and potentially earlier than, their Roman analogues, raising the possibility that they constituted the inspiration for the Roman versions. The Iranian buckles also incorporate openwork human and animal figures, again paralleling a notable characteristic of the middle imperial Roman military fitting repertoire, especially in the eastern provinces (p. 241: although some early imperial Roman belt plates from Europe did depict motifs such as full human faces or the wolf and twins, albeit in repoussé: Gonzenbach 1991, 115–40, figs 1 and 3).

To summarize, the representational and archaeological evidence for waist-belts from the later Parthian and early Sasanian Middle East and Iran provides parallels, and I would argue reveal the sources of inspiration, for key structural and visual features of middle imperial Roman military belts, ring buckles, frame buckles and the arrangement of such belts with hanging swags.

In Roman use, the new waist-belt designs are accompanied by a novel type of sword-belt, which becomes the standard design used with the new, slide-mounted scabbard form. In general conformation, it is quite clear that this new method of sword portage is an adaptation of that long in general use right across Asia as far as China. The original was worn as a waist-belt, developed by horsemen to allow a longsword to be slung low on the left hip, six-gun style (Trousdale 1975). It was adapted in Roman use to the needs of a primarily infantry army by lengthening the belt and hoisting its right side upwards from the waist to pass over the shoulder to form a baldric. The left side was also worn higher, to keep the scabbard clear of the legs by raising the pommel to armpit height in traditional Roman style, even if the sword was now switched to the left side, 'barbarian' fashion. The adapted form became general even for cavalrymen, partly no doubt due to the homogenization of Roman military dress practice, especially development of the apparently universally-worn 'camp dress' (see below).

However, did the slide-mounted scabbard and broad baldric come into Roman use across the Euphrates or the Danube? In the early second century AD, scabbard slides in Danubian barbarian use are represented on Trajan's Column (Lepper and Frere 1988, pl. LXXIII, scene 262; Trousdale 1975, fig. 88). Bishop and Coulston (1993, 112) observe that the earliest Roman representations, apparently dating to the second century, are also on the Danube, and that the earliest datable representations from the East are Palmyrene sculptures of the later second century AD. 'It is difficult to avoid the conclusion that slide-suspension came into Roman use through contact with steppe peoples in the Danubian zone' (Bishop and Coulston 1993, 112). However, absence of early representational evidence from the East, Roman or indigenous, is not evidence of absence, and the more plentiful data from the later second and third centuries reveals the scabbard slide in general use across western Asia. It is reasonable to suggest that it was long-established there by that time. In these slightly later representations from Mesopotamia and Iran, the scabbard slide is attached to a highly characteristic kind of waist-belt: wide across the front and terminating in a hanging strap end, with a discoid plate which is clearly for the attachment of the other end of the belt to its rear, threaded through the scabbard slide and tied off (Fig. 26:A, B and E). This is precisely the same conformation as the Roman sword-belt, which differs only in being slung over the right shoulder rather than round the waist. These belt characteristics seem to be absent from the early Danubian representations discussed above. The conclusion offered here is that it is likely that the Romans encountered peoples using slide-mounted swords on both the Danube and Euphrates frontiers, and that they seem to have adopted the practice from both – but that it was the Eastern sword-belt form, with its large front plate-fastener and hanging strap end so suitable for elaborate decoration, which passed into general Roman use.

Western Asiatic sword scabbards exhibit other features possibly exported to the Roman world along with the scabbard slide. Eastern scabbards are depicted with a median ridge and a slightly flaring, square-ended form (Fig. 26:A); the flaring 'box chape', so common in bone in Roman Europe although

curiously attested only by a metal version at Dura **582**, was evidently common in the East, and may well have originated there.

In conclusion, there are general grounds for anticipating that the armies and soldiers of the Eastern frontiers might have had a much greater role in the development of early and middle imperial Roman martial material culture and practices than they usually receive credit for. More specifically, there is compelling evidence that a number of the key features of middle imperial soldierly dress and personal equipment originated on and beyond the eastern frontier, and presumably made their way into Roman use through their adoption by eastern Roman units, resulting from their experiences on the battlefield, and from recruitment of local peoples bearing such material culture.

Much research remains to be done on all this. However, for our immediate purposes, in my view the data we already have strongly suggests that too little attention is paid to the contribution of the East to the ways of the middle imperial Roman military, and the material culture of its soldiers. Further significant discoveries may be anticipated. For example, it may well be that it was not only Partho-Sasanian helmet types which third-century Roman soldiers encountered at places like Dura which would subsequently feed into the renewed, or intensified 'Orientalization' of the armies a few decades later. Once again, there may have been major Eastern influence on that most symbolic of martial accoutrements, the waist-belt. It is now generally accepted that the well-known buckles with opposed pairs of animal heads on the loop, one of the most striking types of military find from fourth-century Europe, are a Roman provincial military style, and do not connote 'Germanic' cultural affiliations as was once thought (e.g. Hawkes and Dunning 1961; Bishop and Coulston 1993, 178). Quite the reverse: animal-head buckles were subsequently transmitted to the Northern 'barbarian' world through imitation of Roman military equipment and inspired the animal ornament on much early medieval 'Germanic' metalwork. The origin of the Roman buckles remains obscure. However, Ghirshman identified a small group of unprovenanced but very probably Iranian buckles with paired, confronted animals on the loop (Fig. 141:D and E; Ghirshman 1979, 176–82, pl. 4). Like the frame buckles discussed above, he also dates these to the Parthian period, although his grounds are unclear. He does note that such buckles are hard to parallel in Central Asia (Ghirshman 1979, 178); the main parallels are clearly the Roman versions of the fourth century AD. If these buckles do indeed belong to the Parthian or early Sasanian period then, it may be suggested, the late Roman opposed animal-head buckles may prove to be another, extremely important, example of western Asiatic influence on the material culture of the Roman military.

However, while such similarities reflect significant processes of interaction and convergence across the frontiers, they of course did not result in complete identity in martial material culture between enemies. Because of strong internal cultural traditions, because each party was interacting with multiple cultures on different frontiers, and above all because each polity did tend, to varying degrees, to express its cohesion and identity through military dress and equipment, in overall terms Romans, Iranians and other identity groupings did retain a level of material distinctiveness in the accoutrements of war. The result expresses a fascinating tension between the tendency of armies to converge in material culture, and the need and desire for each political and military community to maintain a sense of its own identity and distinctiveness. This was especially marked among the Romans.

As we have seen, the dress and equipment of the third-century *miles* was a patchwork of elements, most of which were drawn from the peoples around or beyond the northern and eastern frontiers. Yet, through a process of *bricolage*, the resulting ensemble had been co-opted and relabelled as Roman. It was fully integrated as part of the *habitus* of the *miles*, which remained overtly Roman, and connected with contemporary civil traditions (the white and purple tunic) and with long-standing Roman soldierly traditions: the crunch of the hobnailed boot, the jangling belt, the special jargon of the soldier, and the traditions of regiment, army, cult and command. The Romans, in particular, reveal a paradoxical contrast between a thirst for foreign ideas on the one hand, and a need to integrate successful innovations into a strongly normative martial material culture on the other. We have examined the mechanisms facilitating such importations, but what were the motivations and forces behind the drive towards uniformity in aspects of Roman military material culture?

Explaining homogeneity of Roman military dress and equipment

One of the most striking characteristics of the Dura assemblage is the degree to which so much of it matches finds from other Roman frontiers, not only in general form, but often in the finest details of manufacture and decoration. Finding so many martial artefacts on the Middle Euphrates which are near-identical to, and often indistinguishable from, discoveries made at other Roman military sites as far away as Scotland and Mauretania demonstrates a remarkable empire-wide tendency towards uniformity and homogeneity, albeit with limited variation, in much Roman military equipment in the third century AD. It does not exhibit the near perfect uniformity of many modern armies supplied by industrialized mass production and regulated by detailed specification; the former, and almost certainly the latter, did not exist in Roman times (see below). Roman equipment exhibits some notable, if fairly circumscribed, stylistic variation, to some extent regional, around the norms, e.g. in the shape and decoration of fittings added to standard general forms of belts and baldrics, scabbards or cloaks. Even if most Durene military artefacts lack specific contextual evidence, it is this close conformity to Western Roman parallels which allows many to be regarded with confidence as belonging to soldiers of the Roman military. And while it remains possible that much of the material deposited in the final siege looks European because it was brought in on the backs of European expeditionary troops in 254–6, the evidence of the Durene paintings and graffiti, and other archaeological finds from Syria, show that this region did fully participate in the global Roman military material culture of the first half of the third century AD.

However, seen in conjunction with the foregoing discussion on the evidence for cross-border convergence and emulation in martial practices, there is a paradox here. It was noted above that exchanges of martial culture across frontiers are a widespread phenomenon, and among the Roman soldiery adopting foreign artefacts and practices was a particularly

strongly marked and long-standing cultural characteristic. Given the enormous length of the Roman frontiers and the diverse societies with which they fought and otherwise interacted, and from which they recruited, one might expect that the dress and equipment of the Roman military would be characterized by considerable regional variation and diversity. Yet, the overwhelming impression from many categories of equipment recovered at Dura and broadly contemporaneous sites across the empire is quite the opposite, especially from the more personal items of dress and arms. How can this paradox be resolved?

The suggested explanation is that episodes of adoption of foreign martial material culture and practices were important but probably relatively sporadic, and that they were rapidly incorporated into the empire-wide mainstream by strong internal processes of integration and homogenization. But further questions then arise. The mechanisms and reasons for foreign importations are comprehensible (see above), but once foreign traits came into Roman martial use, how were they spread throughout the armies? How was the empire-wide blending of indigenous and new traits into the observed Roman uniformity achieved? And, not least, why did such marked homogenization occur? How was homogenization of Roman military material culture achieved and maintained?

We have little direct evidence for how Roman equipment was scrutinized and regulated in practice, although an ink text recently discovered at Carlisle gives us a glimpse of the processes of weapon checking and quality control operated by a first-century cavalry unit (Tomlin 1998; 1999, 128–9). This reveals that there were, unsurprisingly, at least general notions of acceptable equipment forms and standards in that unit, and probably more broadly across the military. However, there remains no evidence of central regulation to enforce specific equipment standards, a practice which makes sense in a modern centralized nation-state but which would have been alien to the way Roman and other ancient societies operated. Specifically, there was no central 'Roman War Office' to define and enforce such specifications (*pace* Cheesman 1914, 132 – thanks to Ian Haynes for this reference – and Peddie 1994, 4). Equally important, there was no industrialized mass production to deliver them; in the modern world, central regulation and specification of equipment has evolved in tandem with mass production.

It is suggested instead that, in outwardly conservative Roman society which valued the ways of elders and ancestors, the forces which regulated what was considered acceptable in military dress and equipment were custom and tradition. The guardians of these in each formation were presumably older soldiers as much as centurions or senior officers. These powerful forces, probably supplemented by general peer pressure among the troops to enforce established norms, were in creative tension with the common human taste for the novel, which as we have seen was in practice relatively strong among Romans. Indeed, it might be argued that episodes of innovation in martial material culture provide another example of the military exhibiting a much wider characteristic of Roman civilization: the ability to adopt radical change while representing it as continuity of hallowed tradition (on this human tendency, see Hobsbawm and Ranger 1983). Perhaps the best example of this general characteristic is the 'Augustan revolution', which radically changed so many aspects of Roman life and society, and not least the armies themselves. Yet this revolution was successful in ending generations of civil war precisely because it was presented, and overtly accepted, not as change but as a return to the ways of venerated ancestors and a republic idealized in memory (Syme 1939).

Customary regulation can be very formal and overt, but does not necessarily need to be (and may not even be openly articulated) still to result in strongly normalizing behaviour and practice. An example of such an informal 'self-regulating system' with no overtly articulated rules is provided by the dress and accessories of young Britons, especially university students, over the last forty years. Despite an ideology of difference from, and rebellion against perceived conservative parental *mores*, paradoxically these have always shown strongly normative tendencies. They have themselves remained remarkably conservative in some ways (e.g. in the very widespread wearing of denim jeans, even if the cut of these has varied considerably). However, the norms have themselves evolved significantly: trainers have become near-universal over the last couple of decades, baseball caps more common, and mobile phones have been indispensable accoutrements since the later 1990s.

The forces and processes regulating military dress, equipment and appearance of Roman troops at Dura and anywhere else, then, were probably primarily customary, and operated at the local level of regiment or garrison, where equipment was made and maintained. But over time, as their equipment repertoire evolved, how did the many scattered military contingents keep in step with each other – as they manifestly did – if not by central directive, specification or manufacture? What facilitated convergence and homogenization and, perhaps more interestingly, what motivated it if, as seems certain, it was not imposed from above?

One probably very important mechanism was the movement of influential individuals, especially centurions, between units and provincial army groups. These men were the living repositories of military lore, and their frequent cross-postings provided a means of communicating practices and encouraging normative convergence between bodies of troops. However, in the middle imperial period, it is suggested that the basic mechanism *facilitating* homogenization of Roman military material culture was the frequent and large-scale movement of soldiers and their equipment between frontiers, and the resulting *mass* exposure of *milites* from the various provincial armies to each other's styles of dress, equipment and practices – and indeed to those of foreign allies, many of whom were also sometime enemies. The third century saw large and repeated troop movements (Oldenstein 1976, 77; 1985, 85–6) due to frequent, massive campaigns in civil and foreign wars, resulting in the shifting of huge quantities of equipment the length and breadth of the empire on the backs of the soldiers themselves.

Notably, there were many occasions in the third century when European soldiers – Romans and sometimes 'barbarian' levies – went to the East in the large expeditionary armies needed to face the only comparable empire on Rome's frontiers (see pp. 24–5). As the Persian king Shapur I recorded:

> the Caesar Gordian from the whole of the Roman empire and the nations of the Goths and the Germans raised an army and marched against . . . us . . .
>
> (Shapur I, *KZ*, Greek text, lines 6–9)

A further passage from Shapur's account vividly illustrates that these expeditions also brought men from widely-separated Roman provincial armies into contact with each other, as well as with their Sasanian foes:

> In the third contest, when we marched against Edessa and Carrhae and had the cities laid under siege, Caesar Valerian came upon us. There was with him a force of seventy-thousand men from the nations of Germania, Raetia, Noricum, Dacia, Pannonia, Moesia, Istria, Hispania, Mauretania, Thracia, Bithynia, Asia, Pamphylia, Isauria, Lycaonia, Galatia, Lycia, Cilicia, Cappadocia, Phrygia, Syria, Phoenica, Judaea, Arabia . . . Lydia and Mesopotamia . . .
>
> (Shapur I, *KZ*, Greek text, lines 19–23)

Conversely, African and Eastern troops – from within and beyond the empire – went to Europe. So, when he took Roman troops west to campaign on the Rhine:

> [Severus] Alexander had brought with him many Moorish javelin-men and a huge force of archers from the East and from the region of Osrhoene, together with Parthian deserters who had offered their help; with these he prepared to battle the Germans
>
> (Herodian 6.7.8)

Roman troops, then, were frequently exposed to what was current among fellow soldiers on other frontiers, among their allies and indeed their foes. The instances of exchange and mutual emulation which, as we have seen, are then to be expected (through swapping, purchase, theft, looting or copying), would help to erode any nascent regional distinctions between provincial armies, or would at least prevent significant divergence from the ever-evolving common repertoire. But why was homogenization of many aspects of martial material culture so profound, against the alternative attractions of asserting regional distinctiveness and difference which were an equally possible potential response?

Why was Roman military material culture so strongly homogenized?

In my view much, probably most, of the drive towards uniformity in Roman military dress and equipment came not from above, but from the soldiers themselves, because of the particular nature of Roman soldierly identity (James 1999; 2002).

To be sure, emperors, generals, unit commanders and junior officers all had an obvious interest in encouraging cohesion and a sense of mutual solidarity among the soldiers. Such aims are obviously greatly aided by requiring uniformity, or at least encouraging similarity, of dress and uniform within the armies. We may expect, then, that the soldiers experienced pressures in this direction from above. However, it is also clear that the nature of the relationship between officers and men in the Roman military meant that such things could not simply be dictated as they are in typical modern armies. It is quite evident that, for all the rigour of Roman military training and the notorious severity of its discipline, Roman soldiers were very far from being unquestioningly obedient in the way expected of soldiers in recent centuries. In fact, they were notoriously unruly, and often mutinous. The generally high levels of military effectiveness which they sustained over so many generations is to be put down to motivation and *esprit de corps* as much as training and discipline, for it is evident that in both peace and war their commanders had to exhort and persuade them to their duty, to pander to their sentiments and prejudices, as much as to regulate, command and coerce them.

An arrogant sense of self-worth and unruliness were soldierly traits which, in my view, may be traced to continuity of traditions from the republic, when Roman soldiers were propertied citizens under arms, electors with the right of free speech and the habit of forcefully expressing opinions to their commanders, who were their elected magistrates or pro-magistrates. This traditional liberty of Roman citizen soldiers probably chimed with similar traditions of firm self-expression among the warriors of many peoples filling the ranks of the new permanent *auxilia*. The result during the first three centuries AD was the development of a highly self-aware military identity group, the *milites*. Distinct from the institutional structure of the armies, 'the soldiers' placed great emphasis on comradely solidarity. It is clear from contemporary texts that Roman society as a whole was quite well aware of this partly-autonomous entity, and reveal 'the soldiers' as notoriously sentimental, but also impetuous and dangerous to civilians, to their leaders, and not least to each other. The traditional liberty of soldierly self-assertion developed into growing proneness to mutiny and rebellion, with the soldiers becoming increasingly aware of their political power as the Principate evolved into the naked military autocracy of the Severan era. The soldiers of the Syrian army were prominent in the military rebellions of the period (Eadie 1996). After the death of Elagabalus, for example, *legio IIII Scythica* played a central role in the ensuing struggle for power, promoting the candidacy of its own legate, Gellius Maximus, for the purple in opposition to *III Gallica*'s support for its commander in Syria Phoenice (Speidel 1998). How far this move involved the legion's Durene contingent is unknown, although there is evidence of a breakdown of discipline among men of *cohors XX Palmyrenorum* around that time (*P. Dura* 55).

Even emperors, then, if they wished to hang on to their power and their lives, had to conform, ostentatiously and often theatrically, to the role of *commilito*, 'fellow soldier' (Campbell 1984, 32–59, 191–8), ostensibly sharing the values and material ways of their men, including dress and appearance. This shows that the pressures driving material aspects such as the nature of military dress came from the bottom up, at least as much as from the top downwards. Clearly recognizable modes of dress, defined as Roman and soldierly, were evidently considered to be of great importance by the soldiers themselves. Why was this? In my view, military dress and personal equipment constituted the primary material field in which Roman soldierly identity was created, manifested and lived out. This was in contrast to the *institutional* identity of the regiments and armies, physically manifested more in the construction of installations and in official routines and collective ceremonials. In the detailed forms of dress and of arms, soldiers physically created and visually expressed their individual identities, and perhaps to varying degree the identities of the unit, army group, or arm of service to which they belonged (e.g. cavalrymen with elaborate horse furniture and 'sports' equipment). Perhaps above all, or underlying all, they also expressed their solidarity as *commilitones*, 'fellow soldiers', members of the community of

Roman *milites*, through the strongly normative nature of many aspects of equipment (especially so-called 'camp dress'). This is reflected in representations of soldiers commissioned by or for the men themselves discussed above, on tombstones in some regions, on frescoes at Dura, or on mummy-paintings in Egypt. On grave stele especially, aspects of this material symbolism are prominent and sometimes exaggerated, especially in treatment of that key expression of soldierly identity, the waist-belt (pp. 60–62; Figs 24, 25 and 28).

Norms of dress, then, were very important, but it should be noted that, as we have seen, the norms themselves were not completely static. They evolved over time, sometimes relatively quickly and radically, notably during the middle decades of the second century AD, incorporating new elements in the ways and for the reasons described, but rapidly disseminating and 'naturalizing' them as part of the repertoire accepted and defined as 'Roman military'.

To summarize, it is suggested that the very overt emphasis on soldierly identity and solidarity, materially expressed in sharply-defined ways through a strongly normative code of dress and accoutrements, was in large measure a reflection of the pride and strong self-awareness of a powerful identity group. However, there was probably another, less explicit and more anxiety ridden reason why emperors, generals, and the soldiers themselves laid such strident emphasis on solidarity and uniformity: it was an attempt to conceal, if it could not abolish, contrary dangerous realities, ever present beneath the surface, and too often erupting into the open. The soldiers, deployed across thousands of miles of frontier provinces, were in reality much more heterogeneous than the outward veneer of uniform martial cultural identity implied. There were serious potential fault lines and tensions within the body of the *milites*, divided as they were into regional army groups with very different environmental and cultural experiences, and exhibiting great ethnic diversity in their recruitment bases. Differing regional political and military trajectories placed centrifugal pressures on the community of *milites*, who also nursed various kinds of inter-group rivalries, not least between provincial soldiers and Praetorians. One example of internal rivalry on campaign which, as we have seen, may have involved the Dura garrison itself, is provided by the *Europaioi* in Severus' army at Hatra (p. 17). These internal divisions were a factor in the periodical eruptions of civil war which rocked the empire, especially from the 190s and through the third century, as provincial army groups fought to place their candidates on the imperial throne.

The realities of these internal tensions help to explain, I suggest, the strength of emphasis on solidarity and uniformity encountered in the ideology and material culture of the *milites*; it was precisely because, in reality, uniformity was perhaps little more than tunic-deep, and solidarity among *milites* often highly precarious in the face of regional loyalties, mutual suspicions, and the temptations to mutiny at the behest of ambitious generals.

Manufacture, supply, use and repair of equipment at Dura

Even in peacetime, equipping and maintaining the garrison at Dura required a substantial production capacity – wherever it was located – involving many people. Higher attrition rates in wartime will have made far greater demands. While much production could have been small-scale and occasional or on a 'cottage industry' basis, many items will have demanded much time and very high levels of craft skills, as well as specialist facilities to make. Fabrication of items such as iron helmet bowls, sword blades and mail were jobs requiring great experience and a substantial forge. The manufacture of shield-boards was an elaborate and time-consuming job, requiring considerable dedicated space. Archery in particular would have required constant skilled manufacture and repair of bows, arrows and ancillary tackle. Bows had to be tailored to the individual needs of skilled archers (Coulston 1985, 269). They also took months to make, implying dedicated workshops and storage space, with suitable and stable levels of humidity. One of the most technically demanding areas was the building and maintenance of large artillery pieces. The components for these mechanisms required the highest skills in metallurgy, precision metalworking, and a lot of space.

To this list many other items can be added, not least the working of leather into straps, harness and footwear, and of course textile production for uniforms, armour backing, etc. But where did all this productive activity actually take place? It may be assumed that routine repairs would be carried out on the spot, but to what extent was primary production conducted in the town? Dura, as the command centre for many outposted troops in addition to the resident formations, was probably also the distribution centre, if not the source of supply, for all their material needs. So what is the evidence for the location and organization of manufacture and repair of the equipment of the Durene gamson?

Evidence for arms manufacture at Dura

During the Roman tenure of Dura, while much of the equipment used in the city will have come from elsewhere on the backs of Roman soldiers and their horses when they first arrived, such a large garrison will have had a substantial continuous demand for repair to existing equipment and provision of new kit. The nature of arms procurement during the Principate is not known in great detail. Several items from Dura, especially those exhibiting 'trumpet' decoration of La Tène origin, have excited comment in this regard (e.g. Oldenstein 1976, 77). Frisch and Toll concluded that the many close parallels of these and other Durene pieces with fittings from Europe, and the apparent lack of such items from the East, suggested that most were imports from the West, with some local copying (1949, 1–2, 7). Wright's original unpublished survey of the Dura material (1963) also implicitly assumed that the Dura garrison was dependant on Europe for equipment and ideas, and (quite erroneously, if plausibly at the time) regarded it as backward and 'out of date' because its men were equipped with mail and scale rather than '*lorica segmentata*'. However, the idea that the Syrian army was reliant on imports or models from Europe for routine supply is quite implausible, and derives entirely from recent Orientalist prejudice against Middle Eastern peoples, inherited from highly biased Roman aristocratic sources (Said 1978; Wheeler 1996). Syria was a highly developed province with long-established metalworking traditions of its own. It is far more probable that such items were routinely made in the East, although we do not yet know in any detail the general pattern of production, civil or military, in the region (for a discussion of arms procurement in the East, see Coulston 1985, 257). The apparent shortage of

parallels of military equipment in the East is to be attributed to depositional and preservational factors, and relative lack of research, rather than a real absence.

There is every reason to believe that the army of Syria was primarily supplied from local sources. But where did the Dura garrison procure its equipment? Was it reliant for its arms and clothing on, for example, the legionary bases further up the Euphrates, or the larger cities of Syria Coele?

Given the size and wealth of Dura, and the scale of the military presence in the region, it may be safely assumed that there was local capacity to produce just about anything the soldiers needed in terms of both quality and quantity, at least in peacetime. Even leaving aside the substantial demands on space for storage of serviceable equipment and stockpiling of projectiles, it is likely that work on creating and repairing equipment was an important activity in the town. The assemblage directly shows that high-quality metalwork was produced in the city, something it was only possible to doubt while Dura was seen as a 'distant military outpost' rather than an important, well-connected Mesopotamian city with a garrison. For example, a mould for a seal-box lid from the site provides evidence both for copper alloy production and, by implication, enamelling (Frisch and Toll 1949, 43, no. 35, pl. IX). Combined with an item identified as a partially-fabricated helmet reinforcing bar (**375**), it is clear that the skills to make complex objects, and to decorate them to a sophisticated standard, existed in the town.

However, the specific sites of manufacture tend to be elusive: small-scale work may well have been an occasional activity all over the town in peacetime, and more especially during the final siege. 'Small copper alloy mounts, studs, buckles, etc., would only have needed one man with access to a small hearth and a bag of copper alloy scrap plus a handful of clay. Tracing such production on the ground is not easy' (Allason-Jones and Dungworth 1997, 321). This conclusion, drawn from recent work on third-century metalwork from Hadrian's Wall, suggests that small copper alloy items were indeed worked on such a small scale, often at levels of skill just adequate to the task.

It has been suggested that there was commercial armour production, or at least repair, attested from finds in shops in the market place (at G2-B29 and B31: *Rep*. V, 86; Dabrowa 1981, 70), but the poor standard of site recording makes it possible that these items were deposited during the siege when the *agora* was probably taken over by the military.

Many other crafts, apart from metalworking, were of course required to equip the troops. Again, to judge from the finds themselves, shields were apparently being made at Dura. Some of the boards were incomplete; shields **616** to **618** had never been given bosses. The buried painted shields had been cannibalized for parts first (**616** to **619** had had their iron reinforcing bars/grips removed before burial). Boss **591** shows signs of reuse, and shield **619** had had two bosses during its life. The possibility that there was a specialist shield-painter's workshop at Dura has been raised (*Rep*. VII/VIII, 331; the painter's style is Syrian, n. 7).

With regard to the siege itself, evidently once the city was invested all further repairs and production for the garrison would of necessity be done within the walls, and this may account for some of the crude repairs seen on armour (below). It may also account for the roughness of finish of the artillery bolts, which may well have been made to the minimum standard of finish to guarantee true flight, and shot almost as fast as they could be produced; there is some reason to believe that the heads and shafts were actually assembled in the towers of the 'desert' wall, where it is presumed the machines for which they were intended were sited. Heads were found lacking fixing-nail holes and so are presumed to be unfinished; at least one bolt is certainly unfinished (**805**). Consequently the bolts in particular may be highly unrepresentative of normal standards of finish of such ammunition, but represent emergency production only (p. 215). Recently, just such an emergency workshop has been excavated in a shrine on the main street near the Palmyrene Gate, where during the siege a smithy was apparently turning out projectile heads (Leriche and Mahmoud 1994, 416–17; Leriche 1997, 91–2; James forthcoming). It may be wondered which other aspects of the assemblage are also untypical of normal practice and standards due to the desperate circumstances of their use and deposition.

Maintenance and repair at Dura

Direct evidence of the wear and tear on equipment is to be seen in the Tower 19 material, all of which seems to have been awaiting repair (*Rep*. VI, 439–40). Leather cuisse **441** seems to have undergone repair previously, while the fragment of accessory to copper alloy scale horse armour **449** bears a very rough earlier repair to its scale rows (Fig. 76). The iron scale trapper **450** also bears extensive evidence of incompetent earlier repair, and iron mail fragment **382** preserves a rough repair to some broken rings. The crude bone terminal **185** is probably a rough replacement, maybe made by the wearer himself, of one lost from his military belt. However, these may well represent emergency botching during the siege, and by no means suggest an absence of skilled capability then or earlier: there are probably also many repairs too good to be easily detectable. Shield boss **591**, with double sets of rivet holes, seems to have been recycled onto a second shield-board at some stage in its life.

Who made and repaired equipment, and where?

Our current understanding of the organization of manufacture and procurement of military equipment at this period, based essentially on European evidence, is that it was decentralized, and conducted at various scales. Its manufacture was partly free enterprise, with extensive military production in many places. In wartime it had long been military practice to compel civilian smiths to switch to arms manufacture (Bishop 1985b, 16–17; Bishop and Coulston 1993, 183–4; Oldenstein 1976, 68–86). There was as yet nothing like the system of state arms factories of the fourth century (James 1988). It is to be expected that the mechanisms of supply varied through time and across geographical space (Bishop and Coulston 1993, 184); particularly in the highly urbanized East, it may be that there was less need for the army to supply itself. However production was organized, it is likely that there was only a limited specialist arms industry during the Principate. Across the empire, local communities of bronze workers and blacksmiths probably included some arms manufacture as part of a far wider general repertoire of production (J. Paddock, pers. comm.). Although many types of fittings are found from one end of the empire to

the other, evidence such as die-linking implies that manufacture was local, within provinces or even at the level of individual garrison stations, as in Upper Germany (Oldenstein 1985, 85–6); Hadrian's Wall has also produced evidence consistent with very small-scale local production of fittings around AD 200 (Allason-Jones and Dungworth 1997, 319–20).

It is likely, then, that at Dura military equipment was made and maintained by all sorts of civilians, veterans, or even serving soldiers: the evidence from Hadrian's wall is consistent with soldiers (or perhaps their personal servants?) making simple strap fittings (Allason-Jones and Dungworth 1997). It is probable that there were a number of specialist armourers, particularly for the manufacture and repair of items requiring a high level of craft skill. As we have seen, the Dura shields imply that there may have been other specialists like the painter (although whether of shields or other items is unspecified) recorded at Bostra, apparently attached to, rather than a soldier of, *III Cyrenaica* (Bowersock 1971, 230, pl. xix; 1983, 96 n. 19; Speidel 1977, n. 18; information from Julian Bowsher). Such individuals, in particular bowyers who probably had to work especially closely with the individuals for whom they made weapons (see above), may well have been serving soldiers. Representations and epigraphic evidence show that such crafts in the Roman world were usually male preserves, although the employment of women in some roles is not ruled out. Textile production was traditionally a domestic, female task: contemporary Palmyrene tomb-portraits show women with spinning equipment, suggesting that at least conventionally, textile working was indeed a female role in the region at the time, probably in both town and country. It may be that women of the soldiers' own *familiae* made uniform garments for their menfolk, or for sale to the regiment (clothing was certainly a commodity traded at Dura: cf. the graffiti in the House of Nebuchelus, *Rep*. IV, 79–145; Pollard 2000, 184–5). There will also have been civilian smiths, carpenters and other artisans serving the urban community and the district, and it is likely that on occasion, if not regularly, at Dura as elsewhere, they were hired or required to produce for the soldiers, turning out, perhaps, copies of belt-fittings, brooches, simple weapon heads, leather harness and shoes.

In reality, there was probably much overlap between civil and military work among the craft workers. Silver items such as the elaborate baldric fastener 17 may have been a rare commission made by a civilian jeweller, rather than a venture into precious metal by a bronze-smith; the workmanship, as well as the material, is of a considerably higher standard than many of the copper alloy equivalents. Given the impression of commercial enterprise among Roman soldiers of the period in Egypt (Alston 1995) it seems likely enough that specialist soldier-craftsmen, as at least some bowyers may have been, might also produce arms for civilian clients (e.g. hunting weapons), working openly or illicitly.

There remains the likelihood of importation from elsewhere, and not just during hurried preparations for war. The legionary detachments may also have drawn on their parent bases far upriver. In wartime, it is also reasonable to assume that *matériel* might need to be procured elsewhere in Syria. And it may well be, for instance, that many of the needs of the officer class could not be met at Dura itself – or indeed that they deliberately chose to equip themselves in ways unavailable to others locally as a way of enhancing their status and separateness. Whether the skills to work materials such as ivory (**47**, **183**, **252**, **573**), or rock-crystal (**531**), existed at Dura is an interesting point. One may suspect that textiles exotic in source and perhaps nature were also selected for officers' uniforms.

Evidence for the use of equipment in combat

As set out above (p. 8), a full reconsideration of the implications of the assemblage for war-fighting at and around Dura demands that the artefacts be examined alongside the structural and contextual data which is being extensively re-explored by the current Franco-Syrian expedition, and that study is also made of new finds of military equipment from the city (mostly projectiles: James forthcoming). This, then, is a task for the future. However, a few preliminary observations may be made here.

Surprisingly, relatively little of the material bears evidence of its use in the form of damage unambiguously incurred in battle, rather than before or after; for example, the denting on several copper alloy shield-bosses from the Tower 19 mine complex could well be due to the collapse of the Roman countermine after their owners had been killed, rather than weapon-blows incurred during the fighting. A clearer case of damage due to use in action is iron bolt-head **749**, which does appear to have been shot against something solid. All the equipment recovered from inside Tower 19 was damaged, awaiting repair (Table 3). Some of this may be the result of combat damage, most notably the catapult bolt-head lodged in horse armour **451** (unless this was a case of 'friendly fire': p. 115). However, in many cases, wear and tear and accident are equally likely causes for damage and the examples of repairs discussed above.

The composition of the assemblage also provides some general information about war fighting at Dura, mostly regarding the Roman side. The mix of equipment preserved presents few surprises, attesting a mixed Roman force of heavily-armoured infantry (probably mostly spear- rather than just javelin-armed, on general historical grounds: Herodian, 4.10.3; Stephenson 1999, 70) with a substantial cavalry element. The latter included the armoured cavalry which were a feature of Partho-Sasanian armies. Archery was evidently widely practiced, again unsurprising on the Eastern frontier and in the context of a siege, and of course the garrison was provided with the arrow-shooting and stone-throwing torsion weapons essential at the time to the defence of fortifications.

One point of interest discussed above is the possibility (and no more than that) that some Roman soldiers at Dura may sometimes or routinely have dispensed with helmets, perhaps for cultural or practical reasons (due to the risk of heat exhaustion, or perhaps just temporarily in special circumstances like mine fighting: pp. 102–3).

Reconstructing the appearance of third-century Roman soldiers at Dura

While the foregoing has discussed in detail the nature and composition of the military assemblage from Dura, the following is an attempt to put much of it back together, in terms of aspects of its use, its visual appearance, and to some extent its meaning as material culture. It is centred around a group of

'reconstruction' paintings (Plates 11 to 13), which are not conventional 'artist's impressions', too often simple end-products tacked onto the report with little or no explanation or justification. Rather, they constitute a detailed visual discourse intended to be examined in conjunction with the text below.

I have argued above and elsewhere (James 1999), that a study of the weapons and especially uniform remains from Dura and other sites, combined with Roman representations of soldiers and documentary evidence, confirms that we are dealing here with far more than simply draping artefacts onto bodies and surrounding them with purely functional 'props'. These artefacts, and the ways in which they were worn and used, were active elements in the very construction of Roman soldierly identity, its physical experience, and its visual signification. This is best discussed, explored and conveyed through a combination of text and image.

Visual representations of archaeological evidence, of which 'reconstructions' are perhaps the most complex and powerful, are a profoundly important complement, and no mere supplement, to text. Indeed they constitute an alternative primary medium for developing, as well as presenting, hypotheses or conclusions about archaeological evidence (James 1996; Moser 1992, 1998, 2001). The paintings presented here are only partly reconstructions in the literal sense, a term which implies the reintegration of known elements into an unambiguously knowable original whole. Most such archaeological 'reconstructions' contain so many inferences, some at least of which are usually entirely speculative, that they are better described as 'simulations' (James 1996). However, the level of specific and detailed knowledge involved in the present cases, of the original nature of the complete artefacts involved – of their spatial juxtapositions on and around human bodies, of the practices and modes of usage they enabled, and the meanings with which they were invested by the wearers–make them much closer to literal reconstructions than many. However, no simulation or visual reconstruction, at least of any complexity, may ever be regarded as 'correct' or 'definitive'; they are always provisional and, to some extent, wrong; the only issue is, how wrong are they?

These particular illustrations should be regarded as provisional statements about, or better, visual arguments and explorations of, the evidence. They are certainly not 'the final definitive truth' about what Roman soldiers actually looked like at Dura. While one of the original purposes of the representations was of course to illustrate how many of the archaeological finds at Dura were employed and spatially related to each other, creating them was never seen as being a finishing touch. Rather, their composition was an integral part of the research, of a reflexive process of interpretation, and began at a quite early stage in the project. Their production prompted many additional questions about the design, purpose, and mode of use of various artefacts, and the combinations and permutations of their employment. Such questions sent me back to the assemblage and other evidence, led to new hypotheses and interpretations, and led ultimately to the fairly extensive reworking of the paintings, especially the cavalrymen.

Some of the issues arising from the creation of the paintings may seem quite mundane or trivial, regarding points as basic as: how far were mixed items of copper alloy and iron armour worn by single individuals? How long were scale shirts if used on horseback? Were they short to avoid interfering with the saddle? Were they split for riding? Preparing the paintings has helped to highlight gaps in the assemblage – e.g. what sort of chamfrons did armoured horses have at Dura, plate types as shown here, or scale versions in the style of the known neck and flank defences? Did Roman cataphracts already carry bows in Partho-Sasanian style? Were sets of dress fittings carefully matched in terms of material and decorative style, conveying messages of taste, wealth, rank or office?

However, from this exercise also came unanticipated insights in understanding the implications of this material culture of potentially much wider importance. These arose from the methods used to prepare the paintings, which are gouaches, the figures being based on photographed models. Notably, to create reference photographs of posed figures and textile draping on which to base Plate 11, I had to mock up a tunic and a cloak in woollen textiles of broadly the correct weight, and I wore a replica third-century *spatha* I had acquired as a souvenir. However, simply wearing these items provided surprising insights into how Roman soldiers of this period would have comported themselves and moved in space. For it became apparent that simply wearing a *spatha* on a baldric, and draping the *sagum* in the careful way repeatedly depicted on representations of soldiers in 'camp dress', compels the wearer to stand upright, and constrains him to move in a quite characteristic way. (The reader might compare the analogous effect of one's awareness of one's own body and of the physical and symbolic constraints placed on it by particular clothing when, for instance, changing from jeans and a T-shirt to a suit and tie, or other formal dress.) In particular, it is noticeable that violent movement, including running, is not easy in such Roman dress due to the physical constraints of the arrangement of sword and cloak. Clearly most of this would go out of the window in combat (encumbering cloaks and perhaps scabbards might sometimes be discarded), but these observations from a piece of inadvertent experimental archaeology provide significant insight into the embodiment of soldierliness among men wearing such 'camp dress', the usual garb of soldiers not actually armed for combat, in Rome, in cantonments across the empire, and among civilians on the streets of cities like Dura-Europos. These incidental observations, combined with wider reading on the active nature of material culture and the archaeology of identity, were instrumental in starting me thinking about the material component of the construction of soldierly identity in the middle Roman empire (James 1999).

Three images are presented, all representing Roman soldiers. Unfortunately there is insufficient evidence from the site to attempt a reconstruction of the attackers, beyond the representation of the 'Persian' helmet (Fig. 48). As far as possible the portrayals show clothing, arms and fittings (many of which are definitely or probably cavalry equipment) attested archaeologically at Dura in the third century AD. They give an impression of the styles, fashions and practices of the period between the 230s and 250s (the date of most of the archaeological material and of the local representations drawn on), and so may conflate some minor short-term changes of fashion, e.g. in brooch-types, details of hairstyles, etc.

Three soldiers in 'camp dress' (Plate 11)

The painting, which depicts Roman soldiers of the second quarter of the third century AD, is based primarily on the Terentius sacrifice scene (Plates 1 and 2, Figs 18 to 20) and the portrait of Heliodorus (Plate 3), with details drawn from the archaeological remains at Dura. The composition is intended to suggest a discussion between a senior (right) and a lesser officer (left), attended by a clerk. The last, the central figure, is a *miles* based on Heliodorus and the rankers in the Terentius scene. The officer on the right is based on Terentius himself and represents a tribune; that on the left is based on figure K in the Terentius scene (Fig. 19), whose appearance is also exceptional, not least in apparently having fair hair and beard in contrast to the typically Syrian black hair and beards of all other figures depicted. He is presumably a junior officer, probably a centurion – the kind of individual perhaps most likely to be transferred into such a unit from elsewhere (legionary centurion *praepositi* are attested commanding *cohors XX Palmyrenorum* when no tribune was in post). The short haircuts and clipped beards reflect those in the Durene paintings and other early to mid-third-century portraits of soldiers.

The Durene paintings and numerous tombstones from other sites are quite consistent in showing long-sleeved tunics of the type shown, which textile remains from Dura and Egypt confirm would have been whitish; the shade will presumably have varied with the quality of the wool, and the age and cleanliness of the garment. Here the clerk is shown in a rather yellowed garment, its purple-substitute tapestry-woven trimming pale and faded compared with the intense colour, probably real Tyrian purple, of the tribune's newer, finer garment – exactly the kind of visual cue which will have helped distinguish between officers and men wearing items of dress otherwise identical in general form. The visual clues of the quality and condition of textiles were probably reinforced by differing qualities, as much as types, of brooch and belt fittings. These are discussed in detail below, but here it is speculated that those of a ranker like the clerk might have been of matching material, but may all have been of cheap copper alloy, varying from reddish to brassy in appearance (although such fittings may usually have been tinned, if not silvered: probable examples include **151** and **158**); those of the junior officer are shown as all silvered, while those of the tribune's dress exhibit a wider range of materials including silver and ivory. There may thus have been few or no overt marks of rank on these ensembles, although an exception may be the prominent swastikas over each thigh of the junior officer's tunic, perhaps the badge of a particular rank or office which needed to be recognizable at a distance (p. 65). His long staff may also have connoted authority, as the centurion's vine-staff did (p. 65).

Waist- and sword-belts provided one of the most important fields for the expression of symbolism and individuality within the accepted customs of military dress. The Terentius painting suggests that the leather could be strongly coloured, as is suggested here for the tribune. Fittings might also have been distinguished by material (here plain copper alloy for the *miles*, ivory and silver for the tribune, and silvering or tinning presumed on the fittings of the junior officer). A matching terminal plate and pendant, based on known openwork types, has been inferred to go with the archaeologically-attested openwork silver baldric fastener **17** here given to the tribune. Sword and scabbard fittings showed similar variations: the ivory fittings (based on **530**, **549** and **573**) and rock-crystal pommel (**531**) of the tribune's sword here contrast with the iron, copper alloy and wood of the swords of his *commilitones*. The clerk's sword has copper alloy scabbard slide **533** and chape **553**, and a wooden hilt assembly like that on sword **513**, while his baldric has a shield-shaped copper alloy fastener like **1**, and no plate on the freely hanging strap end. The sword of the junior officer has an iron chape based on **570**. Sets of fittings on waist-belts are also interpreted as visually relating to status. The clerk's belt has fittings of copper alloy, including a belt plate (**80**) and pendant strap ends like **159**. That of the junior officer sports a set of letter-shaped plates spelling *UTERE FELIX* ('use with good fortune'), a well-known Roman type attested by a fragment from Dura (**78**). The legend suggests it was a presentation piece, perhaps for meritorious service, and so the copper alloy components are shown silvered, as are the heavy hinged strap terminals, based on **135**. The tribune's belt is also showy, with coloured leather and ivory fittings, including a ring buckle (**47**) and studs (like **247** etc.), and hinged strap ends (based on **182** and **184**).

It is notable that these patches of ornament tend to congregate around the waist region, with the exception of the cloak-brooch. The latter was another field for projecting messages of personal wealth, taste, status and perhaps specific rank. The clerk is shown wearing one of the prominent but essentially cheap-looking bow brooches (in this case an early crossbow type, which were common at Dura: e.g. Frisch and Toll 1949, fibula 64). The junior officer is shown with a swastika- shaped plate brooch, a type known at Dura (e.g. Frisch and Toll 1949, fibula 138), speculatively shown matching his tunic symbols. The tribune wears a brightly enamelled disc-brooch (based on the decoration of Frisch and Toll 1949, enamelled bronze 32), and also a signet ring like Terentius's. Following the Terentius painting, the two officers are shown in white cloaks (the tribune's with the purple fringe shown in the painting), which will have made them easy to pick out among the sea of darker cloaks of the ordinary soldiers. The colour of other ranks' cloaks may have varied considerably, mostly through brownish shades if they were of undyed wool.

Breeches are shown as very dark in the Terentius painting, shown here as shades of grey-brown and grey. A few decades later mosaics show them as light grey. The junior officer is shown with socks rolled over the boot-tops, as seen in some depictions. Footwear is not distinguishable in the Terentius painting, but the figures are here provided with the closed shoeboots which were apparently standard military wear at the time.

For a fuller discussion of the symbolism behind this style of Roman military dress, see James 1999.

A Roman cavalryman (Plate 12)

Here an auxiliary cavalryman is depicted, equipped with copper alloy armour and a large oval shield decorated with the newly discovered rear-surface motif seen on shield **617**. He is presumed to have used and lost the lance which was almost certainly his primary offensive arm, and has drawn his *spatha*, which is based on blades like **513**.

The reconstruction is based on representations at Dura, and on the long tradition of tombstone depictions of Roman

auxiliary cavalrymen, which was to some extent revived, in varied forms, in the third century AD (Fig. 32). He is shown without a cloak, based on the Synagogue paintings and other representations of horsemen at Dura, but they may well have been routinely worn on horseback, perhaps only being removed as a potentially dangerous encumbrance when combat was perceived to be imminent.

As many of the details as possible are based on actual archaeological testimony from Dura. For example the helmet is drawn from the small but diagnostic copper alloy helmet fragments **374** to **376**, as well as the larger iron fragments from helmets of the same, well-known general form, **372** and **373**. The exact form of Roman scale shirts, especially their conformation around shoulders and armpits, remains unknown, but the body of the shirt shown here is based on fragments of the kind associated with the chest-plates **415** and especially **416**; numerous twist-keys from these (**420** to **431**) suggest they were a common type at Dura. He wears greaves based on **447**. He may well also have worn thigh protection, cuisses of leather (like **441** and **442**), scale (e.g. **443** and **444**) or overlapping plates (of which **446** may be a fragment). Offensive armament could well have included a bow and quiver slung from the saddle behind the right leg, or a holster of short javelins presumably in the same position, as well as a spear and sword. He might also have carried a mace like **647**. The baldric fastener is a shield-shaped example like **1** or **8**.

The use of the four-pommel saddle, general in the Roman world at the time, is indirectly attested at Dura (pp. 68–9). Saddle cloths, sometimes fringed, are shown on contemporary cavalry tombstones; the colour shown here is a guess. Some details of the precise conformation of the breast and haunch/breech straps which helped secure the saddle remain uncertain, partly due to a lack of detailed contemporary representations, although Dura and other sites have produced numbers of copper alloy strap junctions which evidently belong to these elements. Those shown here include **338** and **339**. There may have been many more small pendants attached to the breast and haunch straps than are shown here. These imply two pendant straps on each side, which contemporary representational evidence and archaeological finds suggest sometimes bore articulated ivy-leaf pendants, but sometimes had none.

The bridle corresponds to forms shown on contemporary tombstones. The iron snaffle bit was attached to the bridle via decorative copper alloy cheek-pieces such as **331**, shown here. The apertures for these in the ends of the bit also appear to have accommodated cast fittings for attaching the reins, e.g. **356** (both elements survived *in situ* on a bit from Celles-les-Waremmes: Jacobi 1924, fig. 17). It is not immediately clear how the muzzle band was attached to the bridle; it is here assumed that the cheek strap was bifurcated for attachment to both muzzle band and cheek-piece. Other bridle fittings shown include strap junction **340** and decorative mount **311**.

The horse shown is a modern Arab; the conformation and physiognomy of the kinds of horses in use at Dura (pp. 66–7) are uncertain. Roman cavalry horses were normally unshod.

A Roman heavy cavalryman (Plate 13)

The painting shows a Roman auxiliary cavalryman equipped as a cataphract, a type of soldier whose presence is implied by the horse armours in Tower 19. Dura has produced some rare graffiti of cavalrymen on armoured horses, but these certainly or probably depict Partho-Sasanian warriors, or are ambiguous in affiliation (e.g. Figs 17 and 23). Fully armoured, largely in iron, the rider is mounted on an armoured horse. With such equipment, it is inferred that, like contemporary Iranian riders and some Roman representations, he was armed with a two-handed lance, the *contus*, and therefore carried no shield. The lance shaft takes its colour from the now lost **646**. Cloaks are not shown in representations of such cavalrymen.

Again, almost all the items shown are directly attested at Dura, but of course the combination shown here is conjectural. It is not clear, for example, that copper alloy and iron defences would have been mixed in the manner shown here. His helmet is based on fragments **372** and **373**, the mail shirt with copper alloy trimming on various Dura finds, such as **381**, **383** to **386**. Short-sleeved mail shirts at Dura like **381** might have been intended for wearing in combination with articulated arm-guards or vambraces, similar in construction to the laminated iron armour, **446**, and in form to those depicted on the '*clibanarius*' graffito (Fig. 23), and examples recently recovered from Carlisle (Zant 2001; McCarthy *et al*. 2001). These defences consisted of plates which overlapped upwards, as required to throw off enemy lance-points running up the shieldless left arm as it gripped the rider's own lance. On reflection, the same consideration makes it likely that such cataphracts would also have worn upward-overlapping plate thigh-protectors constructed like **446**, rather than the downward-overlapping copper alloy cuisses shown here, based on **443** and **444**. The rider is shown with iron greaves, known elsewhere but not at Dura, which produced only the copper alloy example **447** and a fabric liner from another, **448**. Articulated armoured hand-protectors or gauntlets may also have been worn: they are attested in Roman use in the following century (Julian, *Orationes* 1.37.D).

His sword and scabbard are based on **513**. The baldric fittings are based on the copper alloy fastener with La Tène 'trumpet' ornament **24**, and terminal plate **33**. The latter actually has no obvious means of attaching an articulated pendant as shown here and as seen on most contemporary tombstones where the end of the baldric is visible. There is little recognizable evidence of such pendants in the Dura collection, although it is unclear whether this is due to chance, or represents a genuine absence suggesting hinged terminals were not much used on Durene swords. Assuming some were used, one has been added here, based on an example from the Saalburg (Oldenstein 1976, no. 425).

Horse armour **450** is shown, and the form of the matching neck-defence inferred from **452**. No archaeological evidence for chamfrons was found at Dura. The relatively plain plate example shown here is based on one from Straubing (Robinson 1975, pl. 523). There is no evidence that horses had any protection on their legs. For the general conformation of saddle and harness, see above. The bridle cheek-piece is based on **332**. Cataphract horses may well have been much heavier than the Arab depicted.

Such cavalrymen may have carried a bow as well; if so, representational evidence suggests it would have been slung from the saddle behind the right leg, convenient for the right hand. He may also have carried a mace like **647**.

Conclusion and prospect

> 'The military history of the Near East, as of any other region, cannot be separated from its social history'
>
> (Millar 1993, 126)

In form, if not in purpose, the reconstruction images of the soldiers of Dura presented in this volume are 'costume' illustrations, echoing a tradition going back to the sixteenth century (Moser 1998, 66–71, 101–6). While a valid and useful approach in itself (e.g. Sumner 2002), the results generally possess little or no background context, in either the literal or the figurative sense, presenting soldiers in isolation from their physical and social environment. As such, the paintings presented here can also stand as a metaphor for the Dura assemblage of arms, armour and equipment. In the present context of a *Final Report on the Excavations*, this assemblage of material culture has largely been treated, while not in complete isolation, then in limited terms of comparative military archaeology, and of the military history of the Roman/Partho-Sasanian confrontation in the Near East. This, it seems to me, is a legitimate aim for such a volume. However, unless this information is further exploited, and its implications explored and developed, then the whole exercise is of limited value. As we saw above, in criticizing those who study ancient arms and equipment for focusing so narrowly on typological and functionalist approaches, Donald Dudley was moved to write that, 'In the last resort, the design of helmets counts for less than the morale of the men who wear them' (Dudley 1970, 92). We need to see these artefacts as the martial aspect of the wider material culture of ancient societies, through which those who wore and used them experienced and expressed important elements of their social and political identities. This more theoretically-informed approach leads to deeper understandings of the material, and helps to show that it is of more than purely specialist relevance. Like the decontextualized figures of the paintings, the material needs to be put into its background of the city and community of Dura, and the wider cultural and geographical contexts of Syria/Mesopotamia, as well as the two imperial systems which clashed over the region. Starting to do this in the discussion above, through focusing on Dura's significance for understanding issues such as cross-cultural convergence and mutual influence in military affairs between Romans, Syro-Mesopotamians and Partho-Sasanians, and the uniformity of Roman martial material culture, reveals that Dura's military assemblage does indeed have potential value much wider than the small world of military equipment studies.

However, further development of these aspects is for the future. Here, it remains to draw some conclusions regarding the original research questions set out on pp. 7–8, and to outline areas for subsequent study. Some of these remain potentialities, others are already underway.

Progress on the initial research questions

The nature of middle imperial Roman military equipment

The extent and potential of the assemblage proved to be even greater than was initially anticipated. To the remarkable well-preserved and famous finds such as the horse armours and shields has been added a substantial collection of largely unpublished artefacts which constitute the first major data-set of weapons and equipment from the Roman East directly comparable with those of Roman military sites in Europe. The Dura evidence both broadens our understanding of the range of material in general, and through its often excellent preservation has helped to elucidate the structure, purpose and operation of more fragmentary finds from Europe.

Regionality in the Roman military: the army in the East

Where it is comparable with the more familiar patterns of contemporaneous Roman military artefacts, primarily from Europe, the Dura material is remarkable for the many close similarities it reveals between East and West. Clear evidence for local or regional divergences from empire-wide patterns, reflecting regional distinctions between the armies of the East and those of Roman Europe or North Africa, seems very limited, although some appears detectable. There is evidence of local stylistic variation, and probably the regional specialisms which might be anticipated from contemporary literary accounts, e.g. heavy cavalry armour, and a rich tradition of archery. However, many of the traits so far apparently unique to Dura are in organic objects such as shield paintings and leather scale defences, which do not survive in Europe. Consequently, we cannot currently decide whether they are regional traits, or parts of the standard Roman repertoire which happen to survive only at Dura. Only further research across the empire, and good fortune in discovering well-preserved organic remains, will resolve these points. Such resolution is unlikely to come quickly.

However, it must be noted that this and other questions remain compromised by the unresolved possibility that the equipment deposited by the defenders caught in the siege may have included that of European expeditionary troops. This notwithstanding, it should also be noted that local visual representations of undoubtedly Syrian-raised troops do themselves confirm that military dress and equipment in third-century Dura were, both in general form and in fine detail, identical to those seen in contemporary Europe. The more fragmentary remains from other sites in Syria help to confirm regional participation in empire-wide patterns.

Eastern Roman armies and Orientalism

It was noted that much of the literature regarding the Roman military in the East has been marked by Orientalist prejudice against Asiatic peoples (Said 1978), including specific negative attitudes towards people like Syrians, including Syrian-born Roman soldiers, inherited from Roman metropolitan sources (Wheeler 1996). The hope that Dura could be used to help challenge this prejudice has only been partially successful, due to the uncertainty over the identity of the men caught in the siege, some of whom may have been European expeditionary troops. Nevertheless, detailed comparison with European data of the artefacts, and also the installations, documentary records, and visual representations of soldiers from Dura, combined with other recent research on the Roman military (e.g. Kennedy 1996a), all serve to refute the notion that the Syrian army was significantly different from, let alone inferior to, European Roman armies in equipment or performance.

Standardization and specificity of Roman equipment

Through both its archaeological testimony and its visual representations, Dura has demonstrated in the most remarkable

way the high degree of basic standardization of key aspects of Roman military equipment, in form and even in decorative detail, from Scotland and Mauretania to the Euphrates in the mid-third century AD. This phenomenon, which is most strongly marked in dress and personal equipment, demands explanation. In the absence of anything like modern state regulation or mass production, the explanation offered here lies in the historically attested significance of Roman soldierly identity at this period which, it is suggested, was expressed materially and visually through standardization of dress (see 'The nature of Roman military dress' below).

Conversely, the question of specificity of equipment – e.g. correlation of particular types of artefact with types of unit, or even with specific named regiments – has proved all but impossible to address at Dura, since it depends on unequivocal knowledge of the identity of the units based in the city when the artefacts were deposited. The lack of detailed provenances for most items, the absence of inscriptions on the pieces themselves, and the acute uncertainties over the likely composition of the final garrison which arise from detailed examination of the historical context of the siege, all serve to render such questions unanswerable. General theoretical considerations regarding the archaeology of identity and the contextual nature of the meaning of artefacts, discussed above, suggest that such relatively fine levels of artefact or assemblage specificity may in any case have been less rigidly marked and bounded than is often assumed or hoped for, and that they are always going to be hard to detect archaeologically.

Evidence for warfare in the Roman/Partho-Sasanian frontier zone

Dura remains our most important single source of archaeological information for the nature of warfare between Rome and Parthian/early Sasanian empires. This was already well established with the original publication of items like the horse armours and the details of the siegeworks. The present research has added significantly to our knowledge, both through providing a much fuller picture of the equipment of the Roman defenders and also through the important study of the 'Sasanian' helmet. However, as noted above, a full consideration of the nature of war-fighting at and around Dura must await completion of the current renewed research into the siegeworks.

Partho-Sasanian and Syro-Mesopotamian military remains

As a battlefield site, it is evident that a proportion of the material relates to the attackers, and includes a number of items which may be quite securely attributed to them. However, by the same token, the inevitably mixed nature of the finds makes it hard to disentangle Roman and Sasanian remains, while the new awareness of the probability that both sides drew on men and equipment from the culturally-distinctive Syro-Mesopotamian societies which straddled the frontier adds a further source of both interest and complication. While more or less confident attributions of items to all of these groupings have been made here, further progress in identifying the evidence within the Dura assemblage for Western Asian soldiers, equipment and armies must await a better understanding of the broad, regional archaeological background, and especially more comparative material from sites in Syria, Iraq, Iran and beyond.

Evidence for earlier military traditions

Dura has produced disappointingly little artefactual evidence for military practices at Dura under Hellenistic or Parthian rule. However, it should be noted that this reflects the standard patterns seen in the archaeology of the Middle East; military artefacts are rarely found, largely because they were rarely deposited. Indeed much the same is true of the whole Roman empire, especially with regard to urban sites like Dura-Europos. It is the abundance of finds at early- and mid-imperial Roman military sites in Europe, and of middle imperial finds at Dura, which are the anomalies. The pattern at Dura is consistent with the idea that the massive and unusual deposition of military items is very largely a direct result of the events surrounding the siege, and the subsequent abandonment of the city.

Patterns of deposition within the city

As we have seen, there are a number of highly dramatic, and more or less well-recorded sealed groups of military artefacts from Dura, and more limited provenance data for a fair proportion of the rest. However, much of the collection lacks any detailed provenance at all; it is clear that there was no recording of findspots during the early seasons, patchy recording thereafter, and that areas shown as excavated were in fact examined with enormously variable degrees of thoroughness. A survey of the locational data, and experimental plotting of brooch distributions suggests that, given these biases, no significant structure within spatial patterning is to be discerned, beyond the basic concentration of the best finds in the special dry microenvironment of the earth-encased western defences.

Progress on the supplementary research questions

Some other important additional issues have arisen during the course of this study, themes which will themselves inform, and be informed by, consideration of Dura's military material culture. To be addressed elsewhere, these include:

The nature of Roman military dress: symbolic meanings and military ideology

The unexpectedly rich archaeological record for Roman military dress at Dura, combined with the well-known representations of soldiers from the site, has added significantly to our understanding of how soldiers were clad and equipped, and not least the significance of such equipment. Far from being merely functional, it is argued that Roman military dress and appearance was central to Roman soldiers' powerful and overt sense of their own identity and worth. Normative pressures of tradition, custom and a sense of need to express common identity and solidarity in material terms interacted with a marked tendency to imitate novel artefacts and styles from many different enemies and contingents of foreign recruits. The result, by the third century AD, was a wholly new repertoire of Roman military dress and personal equipment which owed little to the Italian origins of the Roman armies, being a hybrid of provincial and even extra-imperial male warrior clothing and fighting traditions. Yet, despite its disparate inspirations, it was surprisingly homogeneous across the empire, exhibiting a quite well-bounded range of variation in components and decorative style. As such, it was the physical manifestation of the identity of one of the most powerful

identity groups in the Roman world: the *milites* (James 1999).

The Roman military community in context at Dura
This important aspect falls outside the remit of the present volume, and is a matter for the future: see below.

Future research
There remains, of course, an immense amount of work potentially to be done on this collection, not least on materials identification and technological analysis. The present corpus will also be supplemented by study of the more modest but important new collection of martial artefacts recovered from the site by the Franco-Syrian expedition (James forthcoming). And, as discussed above, the wider renewed research on Dura, not least on its defences and the evidence for the final siege, will permit a reappraisal of the use of this material culture for its central overt purpose: combat.

However, as argued above, most is probably now to be gained from placing the artefacts back into their wider local, regional and imperial cultural context. We need to consider them as part of the broader archaeology of Dura itself; of the regional archaeology of the Middle Euphrates region, of wider Syria-Mesopotamia; and (as has to a degree been attempted in the foregoing), of the 'global' background of both Greco-Roman West, and Partho-Sasanian East.

At the level of locale, we need to look at the lives of Dura's soldiers in the civil society of the city. Military duties and active campaigning took up only a proportion of a soldier's life. Many, probably most, soldiers had dependants, and lived much of their lives in a domestic milieu, on the streets of the town, or in the countryside. It is the relationship of soldiers and their material culture to this wider world which forms the next new focus for this research. Important and interesting work on the interaction of the Roman military with the provincial population at Dura and elsewhere has recently been published by Pollard (2000). However, this was primarily document-led; the full potential of archaeological approaches, examining material cultural remains, civil and military, in the context of the structures and spaces of the town, remains to be explored.

At the larger contextual scales, somewhat paradoxically, we may perhaps best improve our understanding of Dura by now looking elsewhere, not least in the Middle Euphrates region. By comparison with most other places in the empire the wealth of data from Dura is staggering. However, seen against the duration, scale and complexity of the life of Roman Syria as a whole, the evidence from Dura and a few other broadly contemporary sites like Kifrin (Invernizzi 1986a, 1986b, 1989; Valtz 1987) resembles an archipelago of tiny islands of information in an ocean of ignorance. For example, after the documents from Dura and the new Middle Euphrates archive, we hear almost nothing at all of life or events on the middle Euphrates until Julian's march on Ctesiphon over a century later (Millar 1993, 163). Dura has revealed much, but the relative geographical isolation of its archaeology leads to as many new questions as answers, not least in highlighting areas of continuing ignorance of the material culture of all the peoples of the early first millennium Middle East – and not just their military aspect. It will be expanded exploration of the Eastern Roman and Partho-Sasanian archaeological background, through survey and excavation of cities, military sites and cemeteries, which will at last put Dura clearly into its proper context. Not the least part of this will be the careful cumulative construction of a case for what constituted the repertoires of arms of the various peoples during the early centuries AD, a background against which Dura can be usefully compared. This is a task for several generations of archaeologists to come.

Afterword
The military artefacts from Dura are testimony of the soldiers who lived, fought and died at Dura: they attest Macedonians and Mesopotamians who became Durenes, Iranians and others from the Partho-Sasanian world, Palmyrenes and, overwhelmingly, Romans. Especially at the start of the twenty-first-century, wracked by wars and threats of war between Western and Middle Eastern powers, it would be easy to see the military-dominated archaeology and history of Dura as just part of a depressing story of millennia of intermittent conflict between West and East. It could be dismissed as simply representing some of the early episodes in a history of repeated European interventionism and attempts at domination of Syria and the rest of Western Asia. However, to do so would be a simplistic back-projection of more recent processes and motivations, and would fail to recognize that the past, when examined closely, can be a strange place quite at variance with our expectations.

Cultural connections and interactions across Eurasia were very different in kind two millennia ago, before the establishment of Christianity and the coming of Islam, and before the rise of the modern world of nation states, capitalism and industrialization, or recent European colonialism and the indigenous nationalisms which helped to break it. The story of Dura, even that of its Roman garrison, is not about a mere far-flung Western colonial outpost implanted in Asia; and in the third century AD, the main focus of this study, Roman-controlled Syria and Mesopotamia were very far from being distant, backward dependencies of a European empire.

Dura was a city in the midst of a zone with a vibrant indigenous culture of its own, the Semitic Syro-Mesopotamian world which straddled the Roman and Iranian empires and which, it is increasingly clear, was important both in its own right and as a contributor to the life of both imperial systems. Syria was a major centre of population, wealth generation, political power and cultural achievement, one of the richest and most active regions of an increasingly decentralized empire composed of multiple provincial Roman societies. Syrians were increasingly prominent participants in what amounts to the cultural 'conquest' of Rome by her provinces. As Warwick Ball has convincingly argued (2000), Syrian soldiers and civilians, despite the Orientalist prejudices of Westerners in Roman times and since, were full partners in this imperial enterprise, for better or worse. What constituted 'Roman' civilization and history was, by the later second century AD, created in Syria and by Syrians as much as it was in contemporary Spain, North Africa, Gaul or even Italy. This is strikingly reflected in the careers of men like the senatorial general Avidius Cassius,

Syrian-Roman conqueror of Dura. He was followed by a series of Syrians and part-Syrians who rose to the imperial purple, ruling over Roman Europe as far as Britain, as well as their own homelands. This is less a story of foreigners in Syria, than of Syrians actively engaging in the wider world.

The power of these men was largely made, maintained and broken by the soldiers scattered in garrisons and cantonments across the frontier provinces, mostly in the North and the East. Drawn from a great diversity of ethnic groups, they had created and were constantly reforging a remarkable unified, empire-wide, self-consciously Roman soldierly identity. Alongside the common Hellenistic Greek elite culture which bound together and expressed the common interests of aristocrats from the Euphrates to the Atlantic, so the community of *commilitones*, 'fellow soldiers', was also a vital part of the glue which, for good or ill, held together a vast empire.

It was not in Rome, but in the military bases of frontier provinces, in places like Dura, that this common identity and solidarity evolved, and was so overtly expressed. It was loudly insisted on, because it was in part an attempt to suppress serious internal divisions which too often led to civil war – divisions which arose partly because of the geographical scattering, divergent experiences and underlying ethnic diversity of the soldiers, who by this period were largely recruited quite locally. It is clear that most of the Roman soldiers who served at Dura were not Western occupiers, but were themselves Syrians, whether from Mediterranean districts or from Palmyra or Roman Mesopotamia; some came from Dura itself. Dura, then, was far from being a mere outpost of a foreign military system.

As we have seen, Roman soldierly identity was manifested not least through the manufacture and symbolic use of the items of dress and equipment explored in this volume. The very fact that so much of it is identical from the Atlantic to Mesopotamia means that we cannot be sure whether, during its last days, Dura was defended by Syrian Roman soldiers, European Roman soldiers, or a mixture of both. Eastern troops were so fully a part of this shared military culture that we cannot distinguish them archaeologically, at least for the present. The Roman soldiers of Syria, contrary to ancient and modern prejudices about Eastern troops, served effectively, and often with distinction, at home in places like Dura, and across all the frontiers of the Roman empire (Wheeler 1996, 272). They thought of themselves as Romans, yet in their pride, or even arrogance of service, these men did not forget they were Syrians. In the famous painting from the Temple of Bel at Dura, Terentius and the ranks of *cohors XX Palmyrenorum* are drawn up in Roman regimental ranks, dressed and comporting themselves as Roman *milites* like any others, before a Roman standard. Yet they are making sacrifice to the *tyche* of Dura and to the Syrian deities of Palmyra, the mother city of the regiment, not to distant imagined Rome or the emperor – although they will have done that as well.

The major active role of Syria and its region in the military and cultural history of early first millennium Western Asia and Europe has for far too long been unduly neglected. However, modern research, not the least of which is on the archaeology of Dura-Europos, is helping to bring this historical reality back into the light.

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Abbreviations

AntJ	*Antiquaries Journal*
AJA	*American Journal of Archeology*
ANRW	*Aufstieg und Niedergang der Römischen Welt*
ArchJ	*Archaeological Journal*
BJ	*Bonner Jahrbücher*
CIL	*Corpus Inscriptionum Latinarum*
CRAI	*Comptes rendues de l'Academie des Inscriptions et Belles-Lettres*
D.Pg.	Provisional publication of Dura papyri in the *Preliminary Reports*, in contrast to the final publication, *P. Dura*
IEJ	*Israel Exploration Journal*
ILS	*Inscriptiones Latinae Selectae* (Dessau, H., 1962, Berlin, Weidmann)
Jahrbuch RGZM	*Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz*
JRA	*Journal of Roman Archaeology*
JRMES	*Journal of Roman Military Equipment Studies*
JRS	*Journal of Roman Studies*
KZ	*Kaabah of Zoroaster:* Sprengling 1940, 1953
MZ	*Mainzer Zeitschrift*
ORL B	*Der Obergermanisch-Raetische Limes der Römerreichs, Abteilung B*
P. Dura	Welles *et al.* 1959
P. Mich.	*Michigan Papyri*
Rep. I etc.	See below
RIB	*Roman Inscriptions of Britain*
RGK Bericht	*Bericht der Römisch-Germanischen Kommission*
RLÖ	*Der Römische Limes in Österreich*
SJb	*Saalburg Jahrbuch*
Tab. Vindol. II	*Tabulae Vindolandenses II:* A.K. Bowman & J.D. Thomas, 1994, *The Vindolanda Writing-Tablets (Tabulae Vindolandenses II)*, British Museum Press
ZHWK	*Zeitschrift für Historische Waffen- und Kostümkunde*
ZPE	*Zeitschrift für Papyrologie und Epigraphik*

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Tables

Table 1
The Yale/French Academy excavations: chronology and finds record series

Season	Dates	Finds register no. sequences
First season	13 April – 6 May 1928	n/a
Second season	25 October 1928 – 31 March 1929	n/a
Third season	30 October 1929 – 9 April 1930	n/a
Fourth season	31 October 1930 – 29 April 1931	n/a
Fifth season	26 October 1931 – April (?) 1932	E0000
Sixth season	late October 1932 – late March 1933	F0000
Seventh season	late October 1933 – end of March 1934	G0000
Eighth season	30 October 1934 – 20 February 1935	H0000
Ninth season	29 October 1935 – Feb (?)/March 1936	I/J0000*
Tenth season	late (?) October 1936 – Feb or later 1937	K0000

After Hopkins 1979, xxii–xxiv, except ninth and tenth seasons from information in Yale archives (details provided by Megan Doyon and Richard A. Grossmann).
*Ninth season finds were supposed to be given 'I' series numbers only, but some 'J' numbers were assigned.

Table 2

Artefacts from the Tower 19 countermine

Information collated from *Rep*. VI text and illustrations, matched to the present catalogue.
Fig. 13 = *Rep*. VI, fig. 16
Fig. 14 = *Rep*. VI, figs. 17–18

Key
Degrees of confidence for identifications
*** Certain identification based on specific information
** Equation beyond reasonable doubt
* Highly probable
? Conjectural

Fig.	Item(s)	Key (at fig. 18)	*Rep*. VI, p.:	Identification and probability	Comment
13	'A'	'Bronze ring'			Unidentified copper alloy rings
13	'cm'	'Coat of mail'	193–4	**379*****	
13	'F sword'		194		Lost
13	'F'	'Iron blades or plates'	194 (204, from a shield?)		Unidentified iron
13	'fib' x 2	'Fibula'	194	Perhaps among Frisch and Toll 1949, nos 34, 39, 40, 86, 119	Apparently crossbow brooches
13	'helmet'		194	**371*****	Helmet with attached mail
13	'jade pommel'		194	**532*****	
13	'M'	'Coins'	470–5		
13	'U. fragment'	'Umbo'			Metal not specified
13	'burnt cloth'				Unidentified
14	'Br'	'Fragment plywood shield painted rose'	197		Unidentified
14	'U1' to 'U11'	'Umbo'	197	**589**** **590*** **591**** **592*** **593**** **594*** **595**** **596**** **597*** **598*** **603**** **604****	Shield bosses: metal not specified, apparently copper alloy. See also items 'F(U?)'. NB U9 and U7 are star shapes which correspond to **603** and **604**
14	'c.m'	'Coat of mail'	197	**381*** **382*** **383***	Mostly unidentifiable fragments
14	'S'	'Foot with shoe'			Unidentified
14	'A'	'Bronze ring'	197 'of several sizes'		Various sizes indicated in the figs. Including ring buckles?
14	'R'	'Bronze disc'		**571**? **6***	Chapes? Baldric fasteners?
14	'shield slat'			**632?**	Fragment of a plank shield?
14	'ch'	'Bronze chain'	197	**404* 410***	Several short lengths of chain shown, perhaps include edging from mail
14	'R.F'	–		**566? 567? 568? 569? 570?**	Presumably iron disc chapes?
14	'm', 'M1' to 'M3'	'Coins'	197, 470–5		Coins, some in groups, presumably in purses.
14	'Fib'	'Fibula'			Type unidentifiable
14	'Cl.'	'Nail'			
14	'Z'	'Bronze plate, bent, greave (?)'		**447**?	***greave?
14	'F(U?)'		204 Fragments of 4 or 5 bosses?	**595*** 600* 601* 602* 607*****	Iron fragments thought to be from shield bosses
14	'J'	'Sherd'			Unidentified
–			195–6 Rock crystal pommel	**531****	
14	'Sword'		197, 204	**513* 516? 518****	
–			197 'Pierced ornamental plaques'	**18? 19? 20? 79? 80? 86?**	Baldric fasteners? Belt plates?
–			197 'Fragments of leather and cloth'		Unidentified
–			204 'Javelin'		Unidentified
–			205 'Two arrow points of the sleeve type'		Bodkin heads? (cf *Rep*. VI, fig 15, D, 'quarrel heads')

Table 3
The deposits within Tower 19 according to du Mesnil's typescript

	Western room	Eastern room	Room unspecified	Level unspecified
'upper layer'			'sterile'	
'middle layer'	'two armoured trappers' [misidentified; actually the disintegrated trapper III, **451** and two cuisses **443** and **444**], found 'in the south-east corner at a level corresponding to the first floor.'		'heavily burnt items . . . very numerous iron arrowheads' [Not mentioned by *Rep*. VI in this context]	↑? The following are provenanced in Tower 19, but it is not possible, from the published information, to decide with certainty from which levels in the tower they came: *Rep*. VI, 455 records a wooden ballista bolt shaft (**810**), and 17 iron bodkin heads (including **742**, **744**, **746**, **751**, **752**, **759**, **761**, **764**, **768**, **770**, **772** and **776**). Remains of arrows, *Rep*. VI, 199, 438, 453–5, included arrowheads **676? 677?**, and arrow footings**726** and **732** ↓?
'lower part of the tower'		'two trappers, one of iron, the other of bronze . . . carefully folded, one on top of the other' 'some metres below the ground' 'in the north-western corner' [Trappers I and II, **449** and **450**. Leather cuisses I and II, **441** and **442**, were found with the latter, acc. *Rep*. VI, 439] '[the] *scutum* . . .' [semicylindrical shield **629**] 'recovered from the lower part of the same room'	'The bottom part of the tower again produced a mass of bronze weapons, provided with points . . .' [*Rep*. VI, 199 mentions, but does not further identify, these] 'arrow shafts with their fletching . . .' [*Rep*. VI, 439 mentions 'arrow shafts and heads' including fletched shaftments **733**, **734** and **735**]	

Table 4
Sizes of wooden catapult bolts.
The common dimension from the tail to the beginning of the tapered tip of bolts intended to take socketed heads, or the overall length of bolts with sockets intended for tanged heads (designated by an *).

805	330 mm
810	360 mm
812	300 mm
813	330 mm
814	395 mm
815	330 mm
816*	430 mm
817	330 mm
821	425 mm
822	355 mm
823	295 mm
824	400 mm
825	365 mm
826	435 mm
827	290 mm
830	385 mm
831	350 mm
832*	290 mm

Concordances and indices

Concordance of known provenances and catalogue numbers

Provenances of objects as given in the Yale archive records. For sources and information on the reliability of these, see individual catalogue entries.

Provenance	Cat. no.	Object
[Halebiyeh]	**71**	Iron buckle (from Halabiyeh)
B2-A1	**281**	Copper alloy stud
B2-A1-A2	**469**	Double-stapled copper alloy scale
B2-A4	**471**	Double-stapled copper alloy scale
B2-A25	**367**	Pierced copper alloy saddle plate fragment
B2-B5	**579**	Copper alloy chape
B2-B14	**580**	Copper alloy chape
B2-C2	**108**	Pierced copper alloy plate
B2-D12	**514**	Fragmentary longsword blade
B2-D12	**519**	Fragment of sword blade
B2-D12	**520**	Fragment of sword blade
B2-N Str 1	**517**	Fragment of sword blade
B2-So. Dump	**714**	Three-bladed tanged iron arrowhead
B3-2	**564**	Bone chape
B3-4	**719**	Three-bladed tanged iron arrowhead
B3-28	**256**	Copper alloy stud
B3-30	**409**	Copper alloy edging from iron mail
B3 court	**659**	Leaf-shaped two-bladed tanged copper alloy arrowhead
B3 court	**682**	Three-bladed tanged iron arrowhead
B8-G3	**220**	Small copper alloy leaf-shaped pendant
C3	**144**	Copper alloy strap terminal
C3-A	**126**	Copper alloy mount
C3-A1	**221**	Small copper alloy ivy-leaf pendant
C3-B	**276**	Copper alloy stud
C3-B8	**365**	Fragment of copper alloy 'saddle plate'
C3-B11	**240**	Copper alloy stud
C3-D	**87**	Copper alloy belt plate
C3-D3	**350**	Copper alloy bridle mount (?)
C3-D7	**69**	Copper alloy buckle
C4-28	**23**	Probable copper alloy openwork baldric fastener
C7	**339**	Copper alloy strap junction
Citadel I, 8–9	**665**	Three-bladed socketed copper alloy arrowhead
Citadel, room W2	**63**	Copper alloy buckle loop
D1-13	**455**	Fragments of lamellar-like copper alloy scale garment
D1-St	**587**	Copper alloy plate from a dagger scabbard
D1-St.	**588**	Copper alloy plate from a dagger scabbard
D4-T2	**700**	Three-bladed tanged iron arrowhead
D7	**664**	Three bladed socketed copper alloy arrowhead
D7-d8	**5**	Copper alloy shield-shaped baldric fastener
D-Wall St	**103**	Pierced copper alloy plate
E4	**180**	Bone strap terminal hinge plate
E4-3	**585**	Copper alloy plate from a dagger scabbard
E4-7	**37**	Pierced copper alloy baldric pendant (?)
E4-20-24	**472**	Double-stapled copper alloy scale
E4-34	**288**	Copper alloy domed stud (?)
E4-SW West Corner N	**345**	Possible copper alloy bridle mount (?)
E5-W	**35**	Copper alloy baldric terminal (?)
E7	**215**	Small silver (?) leaf-shaped pendant
E7-20	**90**	Enamelled copper alloy belt plate
E7-29	**83**	Copper alloy buckle or belt plate (?)
E7-D court	**234**	Copper alloy rhomboidal pendant
E7-outside W wall	**663**	Three-bladed socketed copper alloy arrowhead
E7-S. St	**309**	Copper alloy peltate strap mount
E7-W	**128**	Copper alloy double disc mount
E7-W	**152**	Copper alloy strap terminal
E7-W	**153**	Copper alloy strap terminal
E7-W	**577**	Copper alloy chape
E7-W	**725**	Wooden arrow footing
E7-W9	**158**	Silver (?) strap terminal
E7-W9	**201**	Copper alloy leaf-shaped pendant
E7-W9	**207**	Copper alloy leaf-shaped pendant with ring attachment
E7-W9	**208**	Copper alloy leaf-shaped pendant
E7-W9	**209**	Copper alloy leaf-shaped pendant
E7-W9	**210**	Copper alloy leaf-shaped pendant with ring attachment (?)
E7-W9	**211**	Copper alloy leaf-shaped pendant
E7-W9	**212**	Copper alloy leaf-shaped pendant
E7-W9	**214**	Copper alloy leaf-shaped pendant
E7-W9	**316**	Copper alloy rectangular strap mount
E7-W12	**576**	Copper alloy chape
E7-W13	**247**	Bone stud
E7-W13	**738**	Reed shaftment
E8-23	**335**	Copper alloy snaffle bit cheek-piece
E8-23	**681**	Three-bladed tanged iron arrowhead
E8-62	**684**	Three-bladed tanged iron arrowhead
E8-63	**376**	Copper alloy brow-guard
E8-68	**372**	Iron cheek-piece of a helmet
E8-80	**385**	Fragments of an iron mail shirt
F3-1	**229**	Copper alloy leaf-shaped pendant
F3-1	**552**	Fragment of bone scabbard slide
F3-2	**512**	Iron longsword with chape
F3-6	**466**	Copper alloy scale from a lamellar-like garment
F3-10	**263**	Copper alloy stud
F3-16	**550**	Polished bone slide
F3-E. St.	**84**	Copper alloy buckle or belt plate
F3-St. E	**107**	Pierced copper alloy plate
G	**253**	Bone stud
G1	**7**	Copper alloy shield-shaped baldric fastener
G1	**64**	Copper alloy buckle
G1-2?	**527**	Copper alloy hilt-guard plate
G1-5	**662**	Three-bladed socketed copper alloy arrowhead
G1-12	**136**	Hinged copper alloy strap terminal
G1-12	**718**	Three-bladed tanged iron arrowhead
G1-14	**154**	Copper alloy strap terminal
G1-20	**160**	Copper alloy strap terminal
G1-23	**21**	Copper alloy openwork baldric fastener
G1-36	**115**	Copper alloy ring attachment
G1-36	**129**	Copper alloy button-and-loop fastener
G1-36	**329**	Copper alloy snaffle bit cheek-piece
G1-36	**433**	Fragment of copper alloy scale cuirass
G1-36	**491**	Copper alloy scales
G1-44	**363**	Fragment of copper alloy 'saddle plate'
G1-46	**173**	Copper alloy strap terminal
G1-59	**119**	Copper alloy ring attachment
G1-61	**313**	Copper alloy oval strap mount

G1-61	**364**	Copper alloy 'saddle plate'
G1-64	**30**	Copper alloy baldric plate (?)
G1-64	**204**	Copper alloy leaf-shaped pendant
G1-125 (or 105)	**75**	Copper alloy buckle plate (?)
G1-street	**29**	Possible copper alloy baldric fastener
G2-11	**105**	Pierced copper alloy plate
G2-22	**257**	Copper alloy stud
G2-22	**259**	Copper alloy stud
G2-24	**575**	Bone chape
G2-28	**143**	Copper alloy strap terminal
G2-28	**299**	Copper alloy lentoid stud
G2-40	**94**	Copper alloy belt plate
G2-40	**578**	Copper alloy chape
G2-44	**85**	Copper alloy buckle- or belt plate
G2-45	**306**	Copper alloy lunate strap mount
G2-54	**65**	Copper alloy buckle loop
G2-Main St.	**543**	Copper alloy slide
G3-55	**139**	Hinged copper alloy strap terminal
G3-55	**140**	Hinged copper alloy strap terminal
G3-55	**361**	Pierced copper alloy 'saddle plate'
G3-55	**362**	Fragment of copper alloy 'saddle plate'
G3-62	**178**	Copper alloy strap terminal
G3-62	**293**	Copper alloy discoid stud
G3-63	**157**	Copper alloy strap terminal
G3-63	**310**	Copper alloy peltate strap mount
G3-63	**322**	Copper alloy strap mount (?)
G3-64	**249**	Bone stud
G3-66	**203**	Copper alloy leaf-shaped pendant
G3-70	**255**	Copper alloy stud
G3-70	**295**	Enamelled copper alloy discoid stud
G3-79	**356**	Copper alloy harness pendant: rein attachment (?)
G3-a2	**545**	Copper alloy slide
G3-B	**290**	Copper alloy stud
G3-C (?)	**51**	Silver (?) alloy buckle
G3 Dump	**696**	Three-bladed tanged iron arrowhead
G3-F	**52**	Copper alloy buckle loop
G3-F2	**101**	Copper alloy bow-shaped fitting
G3-G10 (?)	**149**	Copper alloy strap terminal
G3-H5	**386**	Fragments of iron mail shirt
G3-H5	**609**	Iron boss
G3-H11	**58**	Copper alloy buckle
G3-M1	**78**	Pierced copper alloy belt plate
G3-NE	**113**	Copper alloy ring attachment
G3-NE	**159**	Pair of copper alloy strap terminals
G3-NE	**353**	Set of three copper alloy harness ornaments
G3-Room NE	**538**	Copper alloy slide
G3-W1	**427**	Twist-fastener from a copper alloy scale cuirass
G4-Main St.	**38**	Copper alloy ring buckle
G5.7-D31	**390**	Fragment of iron mail shirt
G5-16	**358**	Copper alloy harness pendant
G5-17	**327**	Iron and copper alloy snaffle bit
G5-23	**195**	Copper alloy lunate pendant
G5-27	**11**	Copper alloy (?) shield-shaped baldric fastener
G5-29	**331**	Copper alloy snaffle bit cheek-piece
G5-29	**563**	Copper alloy chape
G5-33	**323**	Copper alloy strap mount (?)
G5-33 (?)	**328**	Copper alloy snaffle bit cheek-piece
G5-a1	**340**	Copper alloy bridle mount
G5-A2	**200**	Copper alloy leaf-shaped pendant
G5-D1	**413**	Fragment of iron mail
G5-NW	**109**	Pierced copper alloy plate
G5-NW	**135**	Copper alloy hinged strap terminal
G6-A7	**529**	Copper alloy hilt guard
G6-A8	**333**	Copper alloy snaffle bit cheek-piece
G6-A16	**27**	Pierced copper alloy baldric fastener (?)
G6-A16	**199**	Copper alloy leaf-shaped pendant
G7	**242**	Copper alloy stud
G7-St. D	**348**	Copper alloy bridle mount (?)
G8-St. D	**349**	Copper alloy bridle mount (?)
H1-15	**686**	Three-bladed tanged iron arrowhead
H2	**417**	Plate probably from a copper alloy scale cuirass
House N[orth] of T[ower of the] Arch[ers]	**515**	Fragment of sword blade
J1	**76**	Copper alloy buckle plate
J1	**95**	Copper alloy belt plate
J1-103	**440**	Fragments of very fine copper alloy scale armour
J3 St. B	**418**	Plate probably from a copper alloy scale cuirass
J3/5, Temple of Bel	**412**	Fragment of iron mail
J7	**25**	Copper alloy openwork baldric fastener
J7	**77**	Copper alloy buckle plate
J7 debris along wall S. of Pal. Tower (Palmyrene Gate?)	**41**	Copper alloy ring buckle
J7, Mithraeum	**22**	Probable copper alloy openwork baldric fastener
J7, Infill against wall B	**789**	Tanged iron bodkin
J7-2	**74**	Copper alloy buckle loop
J7-C2	**510**	Copper alloy scales
J7-D1	**467**	Copper alloy scale from a lamellar-like garment
J7-D1	**490**	Copper alloy scale
J7-W1	**32**	Pierced copper alloy baldric fitting (?)
J7-W1	**411**	Copper alloy edging from iron mail
J7-W1	**414**	Copper alloy, probable hook fastener from a mail shirt
J7-W2	**17**	Silver openwork baldric fastener
J7-W2	**116**	Copper alloy ring attachment
J7-W2	**317**	Copper alloy disc
J7-W3	**235**	Copper alloy rhomboidal pendant
J7-W6	**319**	Copper alloy openwork mount
J7-W6	**330**	Copper alloy snaffle bit cheek-piece
J8	**81**	Copper alloy buckle or belt plate
J8	**227**	Copper alloy leaf-shaped pendant
J8 Ramp	**643**	Iron *falx muralis* (?)
J8-W	**646**	Possible wooden spearshaft
J8-W6	**337**	Copper alloy four-way strap junction
J8-W11	**24**	Copper alloy openwork baldric fastener
K1-W	**526**	Copper alloy hilt-guard plate
K2-Main St.	**650**	Bone bow lath
K7-W5	**658**	Triangular two-bladed tanged copper alloy arrowhead
K8-W2	**118**	Copper alloy ring attachment
L3-B7	**701**	Three-bladed tanged iron arrowhead
L7	**273**	Copper alloy stud
L7	**647**	Copper alloy head of a cavalry mace
L7-by Tower 19	**632**	Fragment of a plywood shield
L7-W	**225**	Copper alloy leaf-shaped pendant
L7-W	**404**	Copper alloy edging from iron mail
L7-W	**410**	Copper alloy edging from iron mail
L7-W	**525**	Copper alloy hilt-guard plate
L7-W	**739**	Reed shaftment with intact fletching
L7-W	**562**	Copper alloy chape
L7-W	**572**	Bone chape
L7-W	**721**	Broken shaft of reed and wood
L7-W	**722**	Broken shaft of reed and wood
L7-W	**723**	Broken shaft of reed and wood
L7-W	**736**	Reed shaftment
L7-W1	**6**	Copper alloy shield-shaped baldric fastener
L7-W1	**470**	Double-stapled copper alloy scale
L7-W2	**133**	Copper alloy strap terminal
L7-W2	**392**	Copper alloy edging from iron mail
L7-W5, Embankment at	**620**	Oval wooden plank shield (shield V)
L7-W9	**132**	Copper alloy button-and-loop fastener
L7-W10	**425**	Twist-fastener from a copper alloy scale cuirass
L7-W23	**130**	Copper alloy button-and-loop fastener

L7-W23	**406**	Copper alloy edging from iron mail
L7-W26	**9**	Copper alloy shield-shaped baldric fastener
L7-W28	**338**	Copper alloy three-way strap junction
L7-W38	**110**	Pierced copper alloy plate
L7-8W	**637**	Wood and rawhide shield
L8-W6	**67**	Copper alloy buckle tongue
L8-W104	**378**	Arming cap of woollen cloth and felt
L8-3	**55**	Copper alloy buckle
L8-B2	**99**	Copper alloy belt mount
L8-W10	**198**	Copper alloy lunate pendant (?)
L8-W101	**673**	Three-bladed socketed copper alloy arrowhead
L8-W104	**415**	Fragment of a copper alloy scale cuirass
M7-H3	**147**	Copper alloy strap terminal
M7-H3?	**303**	Copper alloy strap mount
M7-W1	**262**	Copper alloy stud
M7-W2	**291**	Copper alloy stud
M7-W6	**54**	Copper alloy buckle tongue
M7-W7	**56**	Copper alloy buckle loop
M7-W11	**122**	Copper alloy ring attachment
M7-W11	**193**	Copper alloy lunate pendant
M7-W11	**279**	Copper alloy stud
M7-W11	**325**	Copper alloy spur (?)
M8	**408**	Copper alloy edging from iron mail
M8-I4	**93**	Copper alloy belt plate
M8-W1	**88**	Copper alloy belt plate
M8-W2	**405**	Copper alloy edging from iron mail
M8-W2	**683**	Three-bladed tanged iron arrowhead
M8-W3	**282**	Copper alloy stud
M8-W3	**511**	Copper alloy scales
M8-W6	**82**	Copper alloy buckle or belt plate (?)
M8-W6	**102**	Pierced copper alloy plate
M8-W6	**277**	Copper alloy stud
M8-W6	**307**	Copper alloy peltate strap mount
M8-W6	**669**	Three-bladed socketed copper alloy arrowhead
M8-W8	**703**	Three-bladed tanged iron arrowhead
M8-W8	**715**	Three-bladed tanged iron arrowhead
M8-W10	**432**	Fragments of a copper alloy scale cuirass
M8-W10, Temple of Zeus Kyrios	**416**	Fragments of a copper alloy scale cuirass
N7-W2	**457**	Fragment of lamellar-like copper alloy scale garment
N7-W2	**586**	Copper alloy plate from a dagger scabbard
N7-W2	**695**	Three-bladed tanged iron arrowhead
N8-Ramp	**741**	Wooden arrow footing
N8-Ramp	**740**	Reed shaft with wooden footing
N8-Ramp	**720**	Broken shaft of reed and wood
N8-SW Angle	**357**	Copper alloy harness pendant
N8-SW Angle	**73**	Copper alloy buckle loop
N8-W	**33**	Copper alloy baldric terminal (?)
N8-W Dump	**420**	Twist-fastener from a copper alloy scale cuirass
N8-W1	**49**	Probable copper alloy buckle
N8-W1	**573**	Ivory chape
N8-W1	**574**	Bone chape
N8-W1	**716**	Three-bladed tanged iron arrowhead
N8-W1	**717**	Three-bladed tanged iron arrowhead
N8-W1, Embankment in	**633**	Oval plywood shield with no boss
N8-W8	**248**	Bone stud
N8-W8	**258**	Bone stud
N8-W9 embankment	**619**	Oval wooden plank shield (shield IV)
N8-W10	**661**	Three-bladed socketed copper alloy arrowhead
N801, Corner	**809**	Fragment from a wooden bolt shaft with three vanes
N9	**68**	Copper alloy buckle loop
Necropolis, Tomb 6, XIII	**50**	Copper alloy buckle
Necropolis, Tomb 24, loculus XIV (?)	**688**	Three-bladed tanged iron arrowhead
Necropolis, Tomb 24, loculus XIV	**689**	A pair of three-bladed tanged iron arrowheads
Necropolis, Tomb 24, loculus XIV (?)	**690**	Three-bladed tanged iron arrowhead
Necropolis, Tomb 24, loculus XIV	**708**	Three-bladed double-barbed and tanged iron arrowhead
Necropolis, Tomb 24, loculus XIV	**709**	Pair of three-bladed tanged iron arrowheads
Necropolis, Tomb 24, loculus XIV	**710**	Three-bladed tanged iron arrowhead
Necropolis, Tomb 28 in earth fill, not in loculus	**446**	Fragment of cuisse of iron laminated armour
Necropolis, Tomb 37, loculus X	**711**	Three-bladed tanged iron arrowhead
Necropolis, Tomb 37, loculus X	**712**	Three-bladed tanged iron arrowhead
Necropolis, Tomb 46	**713**	Three-bladed tanged iron arrowhead
Necropolis Trench II (?)	**170**	Copper alloy strap terminal
Necropolis Trench II	**97**	Bone belt plate (?)
Necropolis Trench III	**98**	Bone belt plate (?)
Palmyrene Gate	**232**	Copper alloy leaf-shaped pendant
Palmyrene Gate	**278**	Copper alloy stud
Palmyrene Gate	**561**	Copper alloy chape
Palmyrene Gate	**635**	Wood and rawhide shield
Palmyrene Gate	**831**	Broken wooden bolt shaft with two vanes
Palmyrene Gate (?)	**31**	Pierced copper alloy baldric plate or pendant (?)
Palmyrene Gate, south tower	**815**	Broken wooden bolt shaft with two vanes
Ramp. SW corner	**459**	Fragment of lamellar-like copper alloy scale garment
Redoubt	**553**	Copper alloy chape
Street H	**190**	Copper alloy harness pendant
Street H	**296**	Copper alloy lentoid stud
Sts [streets in?] Roman Quarter	**166**	Copper alloy strap terminal
Temple of A[?] stairs	**100**	Copper alloy bow-shaped fitting
Temple of Atargatis	**191**	Copper alloy harness pendant
Tower 2 (Tower of the Archers)	**559**	Copper alloy (?) chape
Tower 2 (Tower of the Archers)	**621**	Fragment of oval wooden plank shield (Cumont fragment A)
Tower 2 (Tower of the Archers)	**622**	Fragment of an oval wooden plank shield (Cumont fragment C)
Tower 2 (Tower of the Archers)	**623**	Fragments of an oval wooden plank shield (Cumont fragment D)
Tower 2 (Tower of the Archers)	**630**	Leather facing and wood from a semicylindrical shield (Cumont fragment B)
Tower 2 (Tower of the Archers)	**832**	Complete wooden bolt shaft
Tower 2 (Tower of the Archers)	**833**	Broken wooden bolt shaft with two vanes
Tower 17	**241**	Copper alloy stud
Tower 18	**808**	Broken wooden bolt shaft with three vanes
Tower 19	**398**	Copper alloy edging from iron mail
Tower 19	**443 and 444**	Fragmentary copper alloy scale armour, probably a pair of cuisses
Tower 19	**441**	Leather 'lamellar' cuisse
Tower 19	**442**	Leather 'lamellar' cuisse
Tower 19	**449**	Armoured horse trapper of copper alloy scales
Tower 19	**450**	Armoured trapper of iron scales
Tower 19	**451**	Fragments of an armoured trapper of copper alloy scales
Tower 19	**629**	Semicylindrical plywood shield
Tower 19	**726**	Wooden arrow footing
Tower 19	**732**	Wooden arrow footing
Tower 19	**733**	Reed shaftment with intact fletching

Tower 19	**734**	Reed shaftment
Tower 19	**735**	Reed shaftment
Tower 19	**742**	Socketed iron bodkin
Tower 19	**744**	Socketed iron bodkin
Tower 19	**746**	Socketed iron bodkin
Tower 19	**751**	Socketed iron bodkin
Tower 19	**752**	Socketed iron bodkin
Tower 19	**759**	Socketed iron bodkin
Tower 19	**761**	Socketed iron bodkin
Tower 19	**764**	Socketed iron bodkin
Tower 19	**768**	Socketed iron bodkin
Tower 19	**770**	Socketed iron bodkin
Tower 19	**772**	Socketed iron bodkin
Tower 19	**776**	Socketed iron bodkin
Tower 19	**810**	Complete wooden bolt shaft, originally with three vanes
Tower 19 (?)	**743**	Socketed iron bodkin
Tower 19 (?)	**748**	Socketed iron bodkin
Tower 19 (?)	**754**	Socketed iron bodkin
Tower 19 (?)	**780**	Socketed iron bodkin
Tower 19 or C3	**676**	Triangular two-bladed collared and tanged iron arrowhead
Tower 19 or M8-W6	**677**	Leaf-shaped tanged iron arrowhead
Tower 19 countermine	**371**	Complete iron helmet
Tower 19 countermine	**379**	Iron mail shirt
Tower 19 countermine	**531**	Rock crystal sword pommel
Tower 19 countermine	**532**	Jade sword pommel
Tower 19 countermine	**599**	Circular iron boss
Tower 19 countermine	**607**	Fragment of iron boss
Tower 19 countermine	**610**	Iron shield reinforcing bar/grip
Tower 19 countermine	**614**	Fragment of iron reinforcing bar/grip
Tower 19 countermine	**615**	Fragment of iron reinforcing bar/grip
Tower 19 countermine (?)	**381**	Sleeve and other fragments from iron mail shirt(s)
Tower 19 countermine (?)	**382**	Fragment of iron mail shirt
Tower 19 countermine (?)	**383**	Sleeve of an iron mail shirt
Tower 19 countermine (?)	**391**	Fragment of iron mail
Tower 19 countermine (?)	**513**	Complete longsword blade
Tower 19 countermine (?)	**518**	Fragment of sword blade
Tower 19 countermine (?)	**570**	Iron chape
Tower 19 countermine (?)	**589**	Circular copper alloy boss
Tower 19 countermine (?)	**591**	Oval copper alloy boss
Tower 19 countermine (?)	**593**	Circular copper alloy boss
Tower 19 countermine (?)	**595**	Circular copper alloy boss
Tower 19 countermine (?)	**596**	Circular copper alloy boss
Tower 19 countermine (?)	**603**	Star-shaped copper alloy boss
Tower 19 countermine (?)	**605**	Fragment of a star-shaped copper alloy boss
Tower 19 countermine (?)	**608**	Circular copper alloy (?) boss
Tower 19, near to	**636**	Wood and rawhide shield
Tower 20	**106**	Pierced copper alloy plate
Tower 22	**3**	Copper alloy shield-shaped baldric fastener
Tower 23-S.O. (*sud-ouest*?)	**314**	Copper alloy discoid strap mount
Tower 24, Embankment N of	**616**	Oval wooden plank shield (shield I, the 'Homeric shield')
Tower 24, Embankment N of	**617**	Oval wooden plank shield (shield II, the 'Amazon shield')
Tower 24, Embankment N of	**618**	Oval wooden plank shield (shield III, the 'Shield of the Warrior God')
Wall Street	**359**	Copper alloy harness pendant
X7-4 dep.	**280**	Copper alloy stud
X7-5	**332**	Copper alloy snaffle bit cheek–piece
X7-5	**419**	Fragment of lamellar-like copper alloy scale garment
X7-5	**461**	Fragment of lamellar-like copper alloy scale garment
X7-30	**346**	Copper alloy bridle mount (?)

Concordance of museum locations and accession numbers with catalogue numbers

Based primarily on Yale records, including information on what was deposited in Damascus, plus information provided by the Royal Ontario Museum.

Damascus, National Museum nos 3444–3452	**834 to 842**	Wooden bolt shafts
Damascus, National Museum no. 10349	**647**	Copper alloy head of a cavalry mace
Damascus, National Museum, no. unknown	**21**	Copper alloy openwork baldric fastener
Damascus, National Museum, no. unknown	**22**	Probable copper alloy openwork baldric fastener
Damascus, National Museum, no. unknown	**23**	Probable copper alloy openwork baldric fastener
Damascus, National Museum, no. unknown	**31**	Pierced copper alloy baldric plate or pendant (?)
Damascus, National Museum, no. unknown	**32**	Pierced copper alloy baldric fitting (?)
Damascus, National Museum, no. unknown	**35**	Copper alloy baldric terminal (?)
Damascus, National Museum, no. unknown	**38**	Copper alloy ring buckle
Damascus, National Museum, no. unknown	**39**	Copper alloy ring buckle
Damascus, National Museum, no. unknown	**51**	Silver (?) alloy buckle
Damascus, National Museum, no. unknown	**68**	Copper alloy buckle loop
Damascus, National Museum, no. unknown	**73**	Copper alloy buckle loop
Damascus, National Museum, no. unknown	**75**	Copper alloy buckle plate (?)
Damascus, National Museum, no. unknown	**78**	Pierced copper alloy belt plate
Damascus, National Museum, no. unknown	**79**	Copper alloy buckle plate
Damascus, National Museum, no. unknown	**80**	Copper alloy buckle plate
Damascus, National Museum, no. unknown	**84**	Copper alloy buckle or belt plate
Damascus, National Museum, no. unknown	**88**	Copper alloy belt plate
Damascus, National Museum, no. unknown	**100**	Copper alloy bow-shaped fitting
Damascus, National Museum, no. unknown	**101**	Copper alloy bow-shaped fitting
Damascus, National Museum, no. unknown	**105**	Pierced copper alloy plate

Damascus, National Museum, no. unknown	**107**	Pierced copper alloy plate
Damascus, National Museum, no. unknown	**110**	Pierced copper alloy plate
Damascus, National Museum, no. unknown	**113**	Copper alloy ring attachment
Damascus, National Museum, no. unknown	**139**	Hinged copper alloy strap terminal
Damascus, National Museum, no. unknown	**140**	Hinged copper alloy strap terminal
Damascus, National Museum, no. unknown	**191**	Copper alloy harness pendant
Damascus, National Museum, no. unknown	**200**	Copper alloy leaf-shaped pendant
Damascus, National Museum, no. unknown	**204**	Copper alloy leaf-shaped pendant
Damascus, National Museum, no. unknown	**206**	Copper alloy leaf-shaped pendant with ring attachment
Damascus, National Museum, no. unknown	**211**	Copper alloy leaf-shaped pendant
Damascus, National Museum, no. unknown	**214**	Copper alloy leaf-shaped pendant
Damascus, National Museum, no. unknown	**225**	Copper alloy leaf-shaped pendant
Damascus, National Museum, no. unknown	**227**	Copper alloy leaf-shaped pendant
Damascus, National Museum, no. unknown	**232**	Copper alloy leaf-shaped pendant
Damascus, National Museum, no. unknown	**249**	Bone stud
Damascus, National Museum, no. unknown	**293**	Copper alloy discoid stud
Damascus, National Museum, no. unknown	**335**	Copper alloy snaffle bit cheek-piece
Damascus, National Museum, no. unknown	**337**	Copper alloy four-way strap junction
Damascus, National Museum, no. unknown	**346**	Copper alloy bridle mount (?)
Damascus, National Museum, no. unknown	**348**	Copper alloy bridle mount (?)
Damascus, National Museum, no. unknown	**353**	Set of three copper alloy harness ornaments
Damascus, National Museum, no. unknown	**359**	Copper alloy harness pendant
Damascus, National Museum, no. unknown	**361**	Pierced copper alloy 'saddle plate'
Damascus, National Museum, no. unknown	**376**	Copper alloy brow-guard
Damascus, National Museum, no. unknown	**417**	Plate probably from a copper alloy scale cuirass
Damascus, National Museum, no. unknown	**418**	Plate probably from a copper alloy scale cuirass
Damascus, National Museum, no. unknown	**449 (part of)**	Armoured horse trapper of copper alloy scales
Damascus, National Museum, no. unknown	**512**	Iron longsword with chape
Damascus, National Museum, no. unknown	**526**	Copper alloy hilt-guard plate
Damascus, National Museum, no. unknown	**527**	Copper alloy hilt-guard plate
Damascus, National Museum, no. unknown	**529**	Copper alloy hilt guard
Damascus, National Museum, no. unknown	**532**	Jade sword pommel
Damascus, National Museum, no. unknown	**543**	Copper alloy slide
Damascus, National Museum, no. unknown	**564**	Bone chape
Damascus, National Museum, no. unknown	**585**	Copper alloy plate from a dagger scabbard
Damascus, National Museum, no. unknown	**588**	Copper alloy plate from a dagger scabbard
Damascus, National Museum, no. unknown	**637**	Wood and rawhide shield
Damascus, National Museum (?)	**608**	Circular copper alloy (?) boss
Damascus, National Museum (?)	**713**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1928.518	**369**	Copper alloy *phalera*
New Haven, Yale no. 1929.382	**645**	Probable iron ground spike from a spear
New Haven, Yale no. 1929.417	**635**	Wood and rawhide shield
New Haven, Yale no. 1929.434a	**805**	Unfinished wooden bolt shaft
New Haven, Yale no. 1929.434b	**806**	Broken wooden bolt shaft with three vanes
New Haven, Yale no. 1929.434c	**828**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1929.434d	**815**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1929.434e	**818**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1929.434f	**831**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1929.434g	**812**	Broken wooden bolt shaft with three vanes
New Haven, Yale no. 1929.436	**46**	Copper alloy ring
New Haven, Yale no. 1929.475a	**652**	Broken archer's thumb-ring of bone
New Haven, Yale no. 1929.522	**321**	Enamelled copper alloy strap mount
New Haven, Yale no. 1929.618	**674**	Three-bladed barbed and socketed copper alloy arrowhead
New Haven, Yale no. 1929.619	**675**	Three-bladed barbed and socketed copper alloy arrowhead
New Haven, Yale no. 1929.771	**452**	Fragment of iron scale horse armour
New Haven, Yale no. 1930.533c	**843**	Carved gypsum artillery stone
New Haven, Yale no. 1930.533e	**844**	Carved artillery stone
New Haven, Yale no. 1930.594 (part of)	**476**	A row of large iron scales
New Haven, Yale no. 1930.594 (part of)	**484**	Two rows of iron scales
New Haven, Yale no. 1930.595	**380**	Iron mail shirt
New Haven, Yale no. 1930.595c (?)	**386**	Fragments of iron mail shirt
New Haven, Yale no. 1930.596a–d	**523**	Fragment of sword
New Haven, Yale no. 1930.597	**823**	Complete wooden bolt shaft with two vanes
New Haven, Yale no. 1930.619a	**788**	Tanged iron bodkin
New Haven, Yale no. 1930.619b	**758**	Socketed iron bodkin
New Haven, Yale no. 1930.619c	**679**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1930.620a	**753**	Socketed iron bodkin(s)
New Haven, Yale no. 1930.659	**845**	Possible artillery stone
New Haven, Yale no. 1930.661	**850**	Carved artillery stone
New Haven, Yale no. 1930.714	**565**	Bone chape
New Haven, Yale no. 1931.590a	**813**	Broken wooden bolt shaft with three vanes
New Haven, Yale no. 1931.590b	**814**	Broken wooden bolt shaft with three vanes
New Haven, Yale no. 1931.590c	**826**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1931.590d	**822**	Complete wooden bolt shaft with two vanes

New Haven, Yale no. 1931.590e	**825**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1931.590f	**824**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1931.590g	**817**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1931.590h	**820**	Damaged wooden bolt shaft with two vanes
New Haven, Yale no. 1931.590i (part of), now Toronto, Royal Ontario Museum no. 933.25.27	**830**	Apparently complete bolt with socketed bodkin head
New Haven, Yale no. 1931.590i (part of), now Toronto, Royal Ontario Museum no. 933.25.27	**782**	Socketed iron bodkin
New Haven, Yale no. 1931.590j	**829**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1931.591b	**724**	Wooden arrow footing
New Haven, Yale no. 1931.591c	**730**	Wooden arrow footing
New Haven, Yale no. 1931.591d	**731**	Wooden arrow footing
New Haven, Yale no. 1931.594a–e	**624**	Fragments of an oval wooden plank shield
New Haven, Yale no. 1931.595a–f	**638**	Fragments of a wood and rawhide shield
New Haven, Yale no. 1931.598	**252**	Large ivory stud
New Haven, Yale no. 1931.599 (part of)	**460**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1931.599 (part of)	**509**	Copper alloy scales
New Haven, Yale no. 1932.707	**556**	Copper alloy chape
New Haven, Yale no. 1932.1397	**29**	Possible copper alloy baldric fastener
New Haven, Yale no. 1932.1403 (part of)	**491**	Copper alloy scales
New Haven, Yale no. 1932.1403 (part of)	**433**	Fragment of copper alloy scale cuirass
New Haven, Yale no. 1932.1403 (part of)	**456**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1932.1412	**90**	Enamelled copper alloy belt plate
New Haven, Yale no. 1932.1414	**228**	Large copper alloy leaf-shaped pendant
New Haven, Yale no. 1932.1419	**85**	Copper alloy buckle or belt plate
New Haven, Yale no. 1932.1420	**94**	Copper alloy belt plate
New Haven, Yale no. 1932.1422	**363**	Fragment of copper alloy 'saddle plate'
New Haven, Yale no. 1932.1434	**329**	Copper alloy snaffle bit cheek-piece
New Haven, Yale no. 1932.1465	**45**	Copper alloy ring
New Haven, Yale no. 1932.1468	**115**	Copper alloy ring attachment
New Haven, Yale no. 1932.1488	**259**	Copper alloy stud
New Haven, Yale no. 1932.1480	**64**	Copper alloy buckle
New Haven, Yale no. 1932.1482	**313**	Copper alloy oval strap mount
New Haven, Yale no. 1932.1483	**27**	Pierced copper alloy baldric fastener (?)
New Haven, Yale no. 1932.1484	**76**	Copper alloy buckle plate
New Haven, Yale no. 1932.1490 (part of)	**143**	Copper alloy strap terminal
New Haven, Yale no. 1932.1490 (part of)	**299**	Copper alloy lentoid stud
New Haven, Yale no. 1932.1516a	**408**	Copper alloy edging from iron mail
New Haven, Yale no. 1932.1519	**662**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1932.1520	**663**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1932.1521	**664**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1932.1522	**577**	Copper alloy chape
New Haven, Yale no. 1932.1523	**554**	Copper alloy chape
New Haven, Yale no. 1932.1524	**578**	Copper alloy chape
New Haven, Yale no. 1932.1525	**364**	Copper alloy 'saddle plate'
New Haven, Yale no. 1932.1531	**220**	Small copper alloy leaf-shaped pendant
New Haven, Yale no. 1932.1532a	**208**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1932.1532b	**201**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1932.1532c	**207**	Copper alloy leaf-shaped pendant with ring attachment
New Haven, Yale no. 1932.1533	**234**	Copper alloy rhomboidal pendant
New Haven, Yale no. 1932.1534	**212**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1932.1542	**177**	Copper alloy strap terminal
New Haven, Yale no. 1932.1563	**28**	Copper alloy baldric fastener (?)
New Haven, Yale no. 1932.1578	**173**	Copper alloy strap terminal
New Haven, Yale no. 1932.1583	**545**	Copper alloy slide
New Haven, Yale no. 1932.1585	**83**	Copper alloy buckle or belt plate?
New Haven, Yale no. 1932.1593	**152**	Copper alloy strap terminal
New Haven, Yale no. 1932.1594	**153**	Copper alloy strap terminal
New Haven, Yale no. 1932.1599	**128**	Copper alloy double disc mount
New Haven, Yale no. 1932.1600	**357**	Copper alloy harness pendant
New Haven, Yale no. 1932.1601	**129**	Copper alloy button-and-loop fastener
New Haven, Yale no. 1932.1603	**306**	Copper alloy lunate strap mount
New Haven, Yale no. 1932.1605	**431**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1932.1606	**424**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1932.1607	**426**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1932.1608	**428**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1932.1615	**340**	Copper alloy bridle mount
New Haven, Yale no. 1932.1629	**65**	Copper alloy buckle loop
New Haven, Yale no. 1932.1633	**190**	Copper alloy harness pendant
New Haven, Yale no. 1932.1640	**7**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1932.1641	**5**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1932.1645	**316**	Copper alloy rectangular strap mount
New Haven, Yale no. 1932.1652	**199**	Copper alloy leaf-shaped pendant

New Haven, Yale no. 1932.1685	**738**	Reed shaftment
New Haven, Yale no. 1932.1688	**247**	Bone stud
New Haven, Yale no. 1932.1716	**725**	Wooden arrow footing
New Haven, Yale no. 1932.1718 (probably)	**566**	Iron chape
New Haven, Yale no. 1932.1720	**644**	Iron ferrule/ground spike for a spear
New Haven, Yale no. 1932.1721	**762**	Socketed iron bodkin
New Haven, Yale no. 1932.1722	**685**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1932.2471	**178**	Copper alloy strap terminal
New Haven, Yale no. 1933.363	**503**	Copper alloy scale
New Haven, Yale no. 1933.412	**180**	Bone strap terminal hinge plate
New Haven, Yale no. 1933.430	**550**	Polished bone slide
New Haven, Yale no. 1933.445a	**733**	Reed shaftment with intact fletching
New Haven, Yale no. 1933.445b	**734**	Reed shaftment
New Haven, Yale no. 1933.445c	**735**	Reed shaftment
New Haven, Yale no. 1933.446a	**807**	Broken wooden bolt shaft with three vanes
New Haven, Yale no. 1933.446b	**821**	Complete wooden bolt shaft with two vanes
New Haven, Yale no. 1933.446c	**816**	Damaged wooden bolt shaft with two or three vanes
New Haven, Yale no. 1933.448a	**732**	Wooden arrow footing
New Haven, Yale no. 1933.448b	**726**	Wooden arrow footing
New Haven, Yale no. 1933.470	**636**	Wood and rawhide shield
New Haven, Yale no. 1933.472	**653**	Leather quiver
New Haven, Yale no. 1933.481	**448**	Fabric liner for a greave
New Haven, Yale no. 1933.533d	**251**	Bone stud fragment
New Haven, Yale no. 1933.642b	**87**	Copper alloy belt plate
New Haven, Yale no. 1933.664a	**325**	Copper alloy spur (?)
New Haven, Yale no. 1933.666	**6**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1933.667	**345**	Possible copper alloy bridle mount (?)
New Haven, Yale no. 1933.668	**41**	Copper alloy ring buckle
New Haven, Yale no. 1933.680	**450**	Armoured trapper of iron scales
New Haven, Yale no. 1933.687a	**669**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1933.687b	**665**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1933.688 (part of)	**744**	Socketed iron bodkin
New Haven, Yale no. 1933.688.2	**770**	Socketed iron bodkin
New Haven, Yale no. 1933.688.3	**751**	Socketed iron bodkin
New Haven, Yale no. 1933.688.4	**752**	Socketed iron bodkin
New Haven, Yale no. 1933.688.5	**759**	Socketed iron bodkin
New Haven, Yale no. 1933.688.6	**768**	Socketed iron bodkin
New Haven, Yale no. 1933.688.7	**748**	Socketed iron bodkin
New Haven, Yale no. 1933.688.8	**754**	Socketed iron bodkin
New Haven, Yale no. 1933.688.9	**776**	Socketed iron bodkin
New Haven, Yale no. 1933.688.10	**772**	Socketed iron bodkin
New Haven, Yale no. 1933.688a.1	**746**	Socketed iron bodkin
New Haven, Yale no. 1933.690a	**799**	Leaf-shaped iron bolt head
New Haven, Yale no. 1933.691	**677**	Leaf-shaped tanged iron arrowhead
New Haven, Yale no. 1933.692	**789**	Tanged iron bodkin
New Haven, Yale no. 1933.693	**514 (part of)**	Fragmentary longsword blade
New Haven, Yale no. 1933.694 (part of)	**517**	Fragment of sword blade
New Haven, Yale no. 1933.694 (part of)	**520**	Fragment of sword blade
New Haven, Yale no. 1933.694a	**514 (part of)**	Fragmentary longsword blade
New Haven, Yale no. 1933.694c	**514 (part of)**	Fragmentary longsword blade
New Haven, Yale no. 1933.694d	**519**	Fragment of sword blade
New Haven, Yale no. 1933.700a	**569**	Iron chape
New Haven, Yale no. 1933.700b	**567**	Iron chape
New Haven, Yale no. 1933.712	**482**	Two rows of large iron scales
New Haven, Yale no. 1933.714	**391**	Fragment of iron mail
New Haven, Yale no. 1933.715	**629**	Semicylindrical plywood shield
New Haven, Yale no. 1934.442a	**784**	Tanged iron bodkin
New Haven, Yale no. 1934.442b	**785**	Tanged iron bodkin
New Haven, Yale no. 1934.443a	**703**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1934.443b	**695**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1934.443c	**693**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1934.443d	**696**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1934.443e	**691**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1934.443f	**680**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1934.450d	**60**	Copper alloy buckle
New Haven, Yale no. 1934.459	**582**	Iron and copper alloy chape
New Haven, Yale no. 1934.463 (part of)	**379**	Iron mail shirt
New Haven, Yale no. 1934.463 (part of)	**381**	Sleeve and other fragments from iron mail shirt(s)
New Haven, Yale no. 1934.463 (part of)	**383**	Sleeve of an iron mail shirt
New Haven, Yale no. 1934.464	**438**	Fragments of a very fine copper alloy scale shirt
New Haven, Yale no. 1934.465	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1934.467	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1934.467b	**437**	Fragments of very fine copper alloy scale armour

New Haven, Yale no. 1934.502a	**727**	Wooden arrow footing
New Haven, Yale no. 1934.502b	**809**	Fragment from a wooden bolt shaft with three vanes
New Haven, Yale no. 1934.516l	**188**	Bone strap terminal
New Haven, Yale no. 1934.516m	**187**	Bone strap terminal
New Haven, Yale no. 1934.521	**97**	Bone belt plate (?)
New Haven, Yale no. 1934.524a	**530**	Bone sword grip
New Haven, Yale no. 1934.528	**47**	Ivory ring
New Haven, Yale no. 1934.529	**573**	Ivory chape
New Haven, Yale no. 1934.531a	**258**	Bone stud
New Haven, Yale no. 1934.531b	**248**	Bone stud
New Haven, Yale no. 1934.637	**260**	Copper alloy stud
New Haven, Yale no. 1934.674	**57**	Copper alloy buckle
New Haven, Yale no. 1934.674b	**61**	Copper alloy buckle
New Haven, Yale no. 1934.674d	**55**	Copper alloy buckle
New Haven, Yale no. 1934.701a	**175**	Copper alloy strap terminal
New Haven, Yale no. 1934.701b	**172**	Copper alloy strap terminal
New Haven, Yale no. 1934.701c	**176**	Copper alloy strap terminal
New Haven, Yale no. 1934.701d	**168**	Copper alloy strap terminal
New Haven, Yale no. 1934.701e	**169**	Copper alloy strap terminal
New Haven, Yale no. 1934.701f	**154**	Copper alloy strap terminal
New Haven, Yale no. 1934.701g	**156**	Copper alloy strap terminal
New Haven, Yale no. 1934.702a	**533**	Copper alloy slide
New Haven, Yale no. 1934.705a	**99**	Copper alloy belt mount
New Haven, Yale no. 1934.705b	**40**	Copper alloy ring buckle
New Haven, Yale no. 1934.706 (part of)	**195**	Copper alloy lunate pendant
New Haven, Yale no. 1934.706 (part of)	**358**	Copper alloy harness pendant
New Haven, Yale no. 1934.706a	**67**	Copper alloy buckle tongue
New Haven, Yale no. 1934.706c	**123**	Copper alloy ring attachment
New Haven, Yale no. 1934.707	**331**	Copper alloy snaffle bit cheek-piece
New Haven, Yale no. 1934.708a	**327 (part of)**	Iron and copper alloy snaffle bit
New Haven, Yale no. 1934.708b	**327 (part of)**	Iron and copper alloy snaffle bit
New Haven, Yale no. 1935.31	**415**	Fragment of a copper alloy scale cuirass
New Haven, Yale no. 1935.33	**17**	Silver openwork baldric fastener
New Haven, Yale no. 1935.41	**25**	Copper alloy openwork baldric fastener
New Haven, Yale no. 1935.89	**808**	Broken wooden bolt shaft with three vanes
New Haven, Yale no. 1935.551	**616**	Oval wooden plank shield (shield I, the 'Homeric shield')
New Haven, Yale no. 1935.552	**617**	Oval wooden plank shield (shield II, the 'Amazon shield')
New Haven, Yale no. 1935.553	**618**	Oval wooden plank shield (shield III, the 'Shield of the Warrior God')
New Haven, Yale no. 1935.557	**390**	Fragment of iron mail shirt
New Haven, Yale no. 1936.2536	**670**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1938.610	**53**	Bone buckle loop
New Haven, Yale no. 1938.624	**250**	Bone stud
New Haven, Yale no. 1938.701	**549**	Polished bone slide
New Haven, Yale no. 1938.702	**551**	Polished bone slide
New Haven, Yale no. 1938.707	**528**	Bone hilt guard
New Haven, Yale no. 1938.708	**572**	Bone chape
New Haven, Yale no. 1938.709	**575**	Bone chape
New Haven, Yale no. 1938.713	**651**	Bone bow lath
New Haven, Yale no. 1938.715	**650**	Bone bow lath
New Haven, Yale no. 1938.716	**649**	Bone bow lath
New Haven, Yale no. 1938.717	**648**	Bone bow lath
New Haven, Yale no. 1938.727	**184**	Bone strap terminal
New Haven, Yale no. 1938.728	**183**	Hinged ivory strap terminal
New Haven, Yale no. 1938.729	**185**	Bone strap terminal
New Haven, Yale no. 1938.729a	**186**	Bone strap terminal
New Haven, Yale no. 1938.730	**552**	Fragment of bone scabbard slide
New Haven, Yale no. 1938.731	**98**	Bone belt plate (?)
New Haven, Yale no. 1938.735	**181**	Bone strap terminal hinge plate
New Haven, Yale no. 1938.1013	**179**	Bone strap terminal hinge plate
New Haven, Yale no. 1938.1014	**182**	Bone strap terminal hinge plate
New Haven, Yale no. 1938.2085	**74**	Copper alloy buckle loop
New Haven, Yale no. 1938.2086	**307**	Copper alloy peltate strap mount
New Haven, Yale no. 1938.2088	**93**	Copper alloy belt plate
New Haven, Yale no. 1938.2090	**308**	Copper alloy peltate strap mount
New Haven, Yale no. 1938.2092	**311**	Copper alloy double-peltate strap mount
New Haven, Yale no. 1938.2093	**37**	Pierced copper alloy baldric pendant (?)
New Haven, Yale no. 1938.2096	**339**	Copper alloy strap junction
New Haven, Yale no. 1938.2097	**103**	Pierced copper alloy plate
New Haven, Yale no. 1938.2098	**356**	Copper alloy harness pendant: rein attachment (?)
New Haven, Yale no. 1938.2099	**109**	Pierced copper alloy plate
New Haven, Yale no. 1938.2100	**587**	Copper alloy plate from a dagger scabbard
New Haven, Yale no. 1938.2103	**192**	Enamelled copper alloy lunate pendant
New Haven, Yale no. 1938.2109	**36**	Copper alloy baldric terminal (?)

New Haven, Yale no. 1938.2118	**581**	Copper alloy chape
New Haven, Yale no. 1938.2119	**202**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2120	**233**	Copper alloy rhomboidal pendant
New Haven, Yale no. 1938.2121	**238**	Copper alloy rhomboidal pendant
New Haven, Yale no. 1938.2122	**230**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2123	**360**	Fragmentary copper alloy harness pendant
New Haven, Yale no. 1938.2126	**237**	Small copper alloy rhomboid pendant
New Haven, Yale no. 1938.2127	**213**	Copper alloy leaf-shaped pendant with chain
New Haven, Yale no. 1938.2128	**215**	Small silver (?) leaf-shaped pendant
New Haven, Yale no. 1938.2129	**216**	Small copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2134	**330**	Copper alloy snaffle bit cheek-piece
New Haven, Yale no. 1938.2135	**586**	Copper alloy plate from a dagger scabbard
New Haven, Yale no. 1938.2136	**209**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2137	**77**	Copper alloy buckle plate
New Haven, Yale no. 1938.2144	**106**	Pierced copper alloy plate
New Haven, Yale no. 1938.2145	**104**	Pierced copper alloy plate
New Haven, Yale no. 1938.2146	**111**	Copper alloy attachment loop
New Haven, Yale no. 1938.2147	**318**	Copper alloy stud
New Haven, Yale no. 1938.2148	**82**	Copper alloy buckle or belt plate (?)
New Haven, Yale no. 1938.2149	**226**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2150	**34**	Copper alloy baldric terminal (?)
New Haven, Yale no. 1938.2151	**134**	Hinged copper alloy strap terminal
New Haven, Yale no. 1938.2152	**344**	Copper alloy bridle mount (?)
New Haven, Yale no. 1938.2153	**342**	Copper alloy bridle mount (?)
New Haven, Yale no. 1938.2154	**343**	Copper alloy bridle mount (?)
New Haven, Yale no. 1938.2155	**26**	Copper alloy openwork baldric fastener
New Haven, Yale no. 1938.2157	**197**	Copper alloy lunate pendant
New Haven, Yale no. 1938.2158	**72**	Copper alloy buckle loop
New Haven, Yale no. 1938.2159	**33**	Copper alloy baldric terminal (?)
New Haven, Yale no. 1938.2160	**333**	Copper alloy snaffle bit cheek-piece
New Haven, Yale no. 1938.2161	**194**	Copper alloy lunate pendant
New Haven, Yale no. 1938.2162	**334**	Copper alloy snaffle bit cheek-piece
New Haven, Yale no. 1938.2163	**86**	Copper alloy belt plate
New Haven, Yale no. 1938.2164	**95**	Copper alloy belt plate
New Haven, Yale no. 1938.2165	**96**	Copper alloy belt plate
New Haven, Yale no. 1938.2168	**20**	Copper alloy openwork baldric fastener
New Haven, Yale no. 1938.2169	**18**	Copper alloy openwork baldric fastener
New Haven, Yale no. 1938.2170	**19**	Copper alloy openwork baldric fastener
New Haven, Yale no. 1938.2172.2	**203**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2172.3	**205**	Copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2174	**222**	Small copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2175	**217**	Small copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2176	**219**	Small copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2177	**218**	Small copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2178	**224**	Small copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2179	**24**	Copper alloy openwork baldric fastener
New Haven, Yale no. 1938.2180	**338**	Copper alloy three-way strap junction.
New Haven, Yale no. 1938.2182	**223**	Small copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.2182a	**319**	Copper alloy openwork mount
New Haven, Yale no. 1938.2184	**367**	Pierced copper alloy saddle plate fragment
New Haven, Yale no. 1938.2204	**189**	Copper alloy pendant with Silenus head
New Haven, Yale no. 1938.2239	**571**	Copper alloy chape
New Haven, Yale no. 1938.2240	**561**	Copper alloy chape
New Haven, Yale no. 1938.2241	**557**	Copper alloy chape
New Haven, Yale no. 1938.2242	**524**	Copper alloy hilt-guard plate
New Haven, Yale no. 1938.2243	**553**	Copper alloy chape
New Haven, Yale no. 1938.2265	**351**	Copper alloy bridle mount (?)
New Haven, Yale no. 1938.2266	**305**	Copper alloy lunate strap mount
New Haven, Yale no. 1938.2269	**538**	Copper alloy slide
New Haven, Yale no. 1938.2270	**534**	Copper alloy slide
New Haven, Yale no. 1938.2271	**540**	Copper alloy slide
New Haven, Yale no. 1938.2272	**536**	Copper alloy slide
New Haven, Yale no. 1938.2273	**535**	Copper alloy slide
New Haven, Yale no. 1938.2274	**537**	Copper alloy slide
New Haven, Yale no. 1938.2275	**547**	Copper alloy slide
New Haven, Yale no. 1938.2276	**548**	Copper alloy slide
New Haven, Yale no. 1938.2279	**539**	Copper alloy slide
New Haven, Yale no. 1938.2287	**579**	Copper alloy chape
New Haven, Yale no. 1938.2316	**525**	Copper alloy hilt-guard plate
New Haven, Yale no. 1938.2319	**310**	Copper alloy peltate strap mount
New Haven, Yale no. 1938.2320	**102**	Pierced copper alloy plate
New Haven, Yale no. 1938.2321	**580**	Copper alloy chape
New Haven, Yale no. 1938.2415	**332**	Copper alloy snaffle bit cheek-piece
New Haven, Yale no. 1938.2416	**164**	Copper alloy strap terminal

New Haven, Yale no. 1938.2417	**155**	Copper alloy strap terminal
New Haven, Yale no. 1938.2418	**174**	Copper alloy strap terminal
New Haven, Yale no. 1938.2419	**145**	Copper alloy strap terminal
New Haven, Yale no. 1938.2420	**163**	Copper alloy strap terminal
New Haven, Yale no. 1938.2421	**162**	Copper alloy strap terminal
New Haven, Yale no. 1938.2422	**141**	Copper alloy strap terminal
New Haven, Yale no. 1938.2423	**171**	Copper alloy strap terminal
New Haven, Yale no. 1938.2424	**167**	Copper alloy strap terminal
New Haven, Yale no. 1938.2425	**142**	Copper alloy strap terminal
New Haven, Yale no. 1938.2426	**165**	Copper alloy strap terminal
New Haven, Yale no. 1938.2427	**166**	Copper alloy strap terminal
New Haven, Yale no. 1938.2428	**160**	Copper alloy strap terminal
New Haven, Yale no. 1938.2429	**133**	Copper alloy strap terminal
New Haven, Yale no. 1938.2431	**144**	Copper alloy strap terminal
New Haven, Yale no. 1938.2432	**54**	Copper alloy buckle tongue
New Haven, Yale no. 1938.2444	**541**	Copper alloy slide
New Haven, Yale no. 1938.2458	**135**	Copper alloy hinged strap terminal
New Haven, Yale no. 1938.2462	**147**	Copper alloy strap terminal
New Haven, Yale no. 1938.2464	**322**	Copper alloy strap mount (?)
New Haven, Yale no. 1938.2465	**341**	Copper alloy bridle mount
New Haven, Yale no. 1938.2466	**349**	Copper alloy bridle mount (?)
New Haven, Yale no. 1938.2467	**15**	Fragmentary copper alloy baldric fastener
New Haven, Yale no. 1938.2469	**350**	Copper alloy bridle mount (?)
New Haven, Yale no. 1938.2470	**159**	Pair of copper alloy strap terminals
New Haven, Yale no. 1938.2472	**170**	Copper alloy strap terminal
New Haven, Yale no. 1938.2473	**148**	Copper alloy strap terminal
New Haven, Yale no. 1938.2474	**149**	Copper alloy strap terminal
New Haven, Yale no. 1938.2475	**221**	Small copper alloy ivy-leaf pendant
New Haven, Yale no. 1938.2489	**425**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1938.2497	**423**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1938.2499	**421**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1938.2500	**429**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1938.2501	**427**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1938.2502	**420**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1938.2532	**658**	Triangular two-bladed tanged copper alloy arrowhead
New Haven, Yale no. 1938.2533	**668**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1938.2534	**661**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1938.2535	**671**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1938.2537	**667**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1938.2538	**655**	Leaf-shaped tanged copper alloy arrowhead
New Haven, Yale no. 1938.2540	**656**	Flat two-bladed tanged copper alloy arrowhead
New Haven, Yale no. 1938.2541	**657**	Flat two-bladed tanged copper alloy arrowhead
New Haven, Yale no. 1938.2542	**660**	Three-bladed tanged copper alloy arrowhead
New Haven, Yale no. 1938.2543	**654**	Leaf-shaped tanged copper alloy arrowhead
New Haven, Yale no. 1938.2545	**672**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1938.2547	**673**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1938.2548	**666**	Three-bladed socketed copper alloy arrowhead
New Haven, Yale no. 1938.2554	**659**	Leaf-shaped two-bladed tanged copper alloy arrowhead
New Haven, Yale no. 1938.2557	**150**	Copper alloy strap terminal
New Haven, Yale no. 1938.2558	**137**	Hinged copper alloy strap terminal
New Haven, Yale no. 1938.2571	**193**	Copper alloy lunate pendant
New Haven, Yale no. 1938.2573	**304**	Copper alloy strap mount
New Haven, Yale no. 1938.2574	**302**	Copper alloy strap mount
New Haven, Yale no. 1938.2580	**290**	Copper alloy stud
New Haven, Yale no. 1938.2595	**44**	Copper alloy ring
New Haven, Yale no. 1938.2597	**43**	Copper alloy ring
New Haven, Yale no. 1938.2982	**58**	Copper alloy buckle
New Haven, Yale no. 1938.2986	**48**	Probable copper alloy buckle
New Haven, Yale no. 1938.2987	**49**	Probable copper alloy buckle
New Haven, Yale no. 1938.2989	**69**	Copper alloy buckle
New Haven, Yale no. 1938.2990	**59**	Copper alloy buckle
New Haven, Yale no. 1938.2991	**56**	Copper alloy buckle loop
New Haven, Yale no. 1938.2993	**66**	Copper alloy buckle loop
New Haven, Yale no. 1938.2998	**62**	Copper alloy buckle loop
New Haven, Yale no. 1938.3046	**328**	Copper alloy snaffle bit cheek-piece
New Haven, Yale no. 1938.3054	**130**	Copper alloy button-and-loop fastener
New Haven, Yale no. 1938.3061	**231**	Fragmentary copper alloy leaf-shaped pendant
New Haven, Yale no. 1938.3068	**146**	Copper alloy strap terminal
New Haven, Yale no. 1938.3084	**288**	Copper alloy domed stud (?)
New Haven, Yale no. 1938.3100	**157**	Copper alloy strap terminal
New Haven, Yale no. 1938.3106	**309**	Copper alloy peltate strap mount
New Haven, Yale no. 1938.3115	**583**	Copper alloy chape
New Haven, Yale no. 1938.3116	**584**	Copper alloy chape

New Haven, Yale no. 1938.3118	**323**	Copper alloy strap mount (?)
New Haven, Yale no. 1938.3119	**355**	Pierced copper alloy plate: horse harness (?)
New Haven, Yale no. 1938.3160	**544**	Copper alloy slide
New Haven, Yale no. 1938.3168	**546**	Copper alloy slide
New Haven, Yale no. 1938.3185	**151**	Copper alloy strap terminal
New Haven, Yale no. 1938.3190	**312**	Copper alloy strap mount
New Haven, Yale no. 1938.3191	**297**	Copper alloy lentoid stud
New Haven, Yale no. 1938.3192	**296**	Copper alloy lentoid stud
New Haven, Yale no. 1938.3193	**285**	Copper alloy domed stud
New Haven, Yale no. 1938.3194	**303**	Copper alloy strap mount
New Haven, Yale no. 1938.3195	**354**	Copper alloy cruciform harness stud
New Haven, Yale no. 1938.3196	**314**	Copper alloy discoid strap mount
New Haven, Yale no. 1938.3197	**365**	Fragment of copper alloy 'saddle plate'
New Haven, Yale no. 1938.3198	**127**	Copper alloy double disc mount
New Haven, Yale no. 1938.3199	**116**	Copper alloy ring attachment
New Haven, Yale no. 1938.3200	**125**	Copper alloy ring attachment (?)
New Haven, Yale no. 1938.3201	**119**	Copper alloy ring attachment
New Haven, Yale no. 1938.3203	**118**	Copper alloy ring attachment
New Haven, Yale no. 1938.3204	**121**	Copper alloy ring attachment
New Haven, Yale no. 1938.3205	**114**	Silver ring attachment
New Haven, Yale no. 1938.3206	**126**	Copper alloy mount
New Haven, Yale no. 1938.3207	**120**	Copper alloy ring attachment
New Haven, Yale no. 1938.3208	**326**	Copper alloy spur (?)
New Haven, Yale no. 1938.3209	**122**	Copper alloy ring attachment
New Haven, Yale no. 1938.3210	**132**	Copper alloy button-and-loop fastener
New Haven, Yale no. 1938.3211	**131**	Copper alloy button-and-loop fastener
New Haven, Yale no. 1938.3212	**117**	Copper alloy ring attachment
New Haven, Yale no. 1938.3217	**286**	Copper alloy domed stud
New Haven, Yale no. 1938.3218	**245**	Copper alloy stud
New Haven, Yale no. 1938.3220	**283**	Copper alloy domed stud
New Haven, Yale no. 1938.3221	**287**	Copper alloy domed stud
New Haven, Yale no. 1938.3222	**244**	Copper alloy stud
New Haven, Yale no. 1938.3224	**254**	Copper alloy stud
New Haven, Yale no. 1938.3227	**261**	Copper alloy stud
New Haven, Yale no. 1938.3229	**292**	Copper alloy stud
New Haven, Yale no. 1938.3230	**291**	Copper alloy stud
New Haven, Yale no. 1938.3232	**262**	Copper alloy stud
New Haven, Yale no. 1938.3276	**347**	Copper alloy bridle mount (?)
New Haven, Yale no. 1938.3298	**336**	Copper alloy snaffle bit cheek-piece
New Haven, Yale no. 1938.3299	**89**	Enamelled (?) copper alloy belt plate
New Haven, Yale no. 1938.3300	**375**	Fragment of possible crown reinforcement
New Haven, Yale no. 1938.3301	**374**	Fragmentary copper alloy crown reinforcement
New Haven, Yale no. 1938.3304	**196**	Copper alloy lunate pendant
New Haven, Yale no. 1938.3311	**352**	Copper alloy bridle mount (?)
New Haven, Yale no. 1938.3312	**320**	Pierced copper alloy strap mount
New Haven, Yale no. 1938.3323	**112**	Copper alloy attachment loop (?)
New Haven, Yale no. 1938.3324	**161**	Copper alloy strap terminal
New Haven, Yale no. 1938.3332	**422**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1938.3371	**70**	Copper alloy buckle loop
New Haven, Yale no. 1938.3388	**10**	Fragment of copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1938.3401	**558**	Copper alloy chape
New Haven, Yale no. 1938.3406	**124**	Copper alloy ring attachment
New Haven, Yale no. 1938.3408	**315**	Copper alloy discoid strap mount
New Haven, Yale no. 1938.3423	**294**	Copper alloy discoid stud
New Haven, Yale no. 1938.3425	**3**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1938.3427	**1**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1938.3428	**14**	Copper alloy baldric fastener
New Haven, Yale no. 1938.3429	**2**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1938.3430	**16**	Copper alloy baldric fastener
New Haven, Yale no. 1938.3431	**8**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1938.3433	**4**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1938.3440	**13**	Copper alloy (?) shield-shaped baldric fastener
New Haven, Yale no. 1938.3441	**596 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3449	**560**	Copper alloy chape
New Haven, Yale no. 1938.3458	**324**	Copper alloy strap mount (?)
New Haven, Yale no. 1938.3466	**91**	Copper alloy belt plate
New Haven, Yale no. 1938.3472	**9**	Copper alloy shield-shaped baldric fastener
New Haven, Yale no. 1938.3473	**81**	Copper alloy buckle or belt plate
New Haven, Yale no. 1938.3496	**604 (part of)**	Star-shaped copper alloy boss
New Haven, Yale no. 1938.3509	**555**	Copper alloy chape
New Haven, Yale no. 1938.3514	**430**	Twist-fastener from a copper alloy scale cuirass
New Haven, Yale no. 1938.3523	**263**	Copper alloy stud
New Haven, Yale no. 1938.3533	**368**	Copper alloy *phalera*

New Haven, Yale no. 1938.3536	**12**	Possible shield-shaped copper alloy baldric fastener
New Haven, Yale no. 1938.3566	**295**	Enamelled copper alloy discoid stud
New Haven, Yale no. 1938.3570	**289**	Copper alloy stud with pierced shank
New Haven, Yale no. 1938.3611	**246**	Copper alloy stud
New Haven, Yale no. 1938.3612	**239**	Copper alloy stud
New Haven, Yale no. 1938.3613	**264**	Copper alloy stud
New Haven, Yale no. 1938.3614	**265**	Copper alloy stud
New Haven, Yale no. 1938.3615	**266**	Copper alloy stud
New Haven, Yale no. 1938.3617	**267**	Copper alloy stud
New Haven, Yale no. 1938.3618	**268**	Copper alloy stud
New Haven, Yale no. 1938.3619	**269**	Copper alloy stud
New Haven, Yale no. 1938.3620	**270**	Copper alloy stud
New Haven, Yale no. 1938.3622	**271**	Copper alloy stud
New Haven, Yale no. 1938.3623	**272**	Copper alloy stud
New Haven, Yale no. 1938.3624	**273**	Copper alloy stud
New Haven, Yale no. 1938.3625	**274**	Copper alloy stud
New Haven, Yale no. 1938.3627	**243**	Copper alloy stud
New Haven, Yale no. 1938.3628	**275**	Copper alloy stud
New Haven, Yale no. 1938.3629	**241**	Copper alloy stud
New Haven, Yale no. 1938.3630	**276**	Copper alloy stud
New Haven, Yale no. 1938.3631	**277**	Copper alloy stud
New Haven, Yale no. 1938.3632	**278**	Copper alloy stud
New Haven, Yale no. 1938.3633	**279**	Copper alloy stud
New Haven, Yale no. 1938.3634	**240**	Copper alloy stud
New Haven, Yale no. 1938.3636	**280**	Copper alloy stud
New Haven, Yale no. 1938.3637	**281**	Copper alloy stud
New Haven, Yale no. 1938.3638	**282**	Copper alloy stud
New Haven, Yale no. 1938.3647	**589**	Circular copper alloy boss
New Haven, Yale no. 1938.3648	**590**	Circular copper alloy boss
New Haven, Yale no. 1938.3653	**405**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3654	**406**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3655	**409**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3656	**407**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3658	**404**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3660	**410**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3664	**236**	Copper alloy rhomboid pendant
New Haven, Yale no. 1938.3668	**377**	Fragments possibly from a copper alloy 'parade' or 'cavalry sports' helmet
New Haven, Yale no. 1938.3676	**591**	Oval copper alloy boss
New Haven, Yale no. 1938.3677	**592 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3678	**594**	Circular copper alloy boss
New Haven, Yale no. 1938.3679	**603**	Star-shaped copper alloy boss
New Haven, Yale no. 1938.3680	**593**	Circular copper alloy boss
New Haven, Yale no. 1938.3685	**596 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3686	**604 (part of)**	Star-shaped copper alloy boss
New Haven, Yale no. 1938.3687	**597 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3688	**597 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3689	**592 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3690	**597 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3691	**592 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3692	**592 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3693	**592 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3694	**592 (part of)**	Circular copper alloy boss
New Haven, Yale no. 1938.3695a–d	**447**	Fragments of a copper alloy greave
New Haven, Yale no. 1938.3700	**595**	Circular copper alloy boss
New Haven, Yale no. 1938.3727	**398**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3728	**399**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3729	**400**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3730	**401**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3731	**402**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3732	**403**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.3744	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3745	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3746	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3747	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3748	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3749	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3750	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3751	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3752	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3753	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.3754	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3755	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales

New Haven, Yale no. 1938.3756	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.3757	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3758	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3760	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3761	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3762	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.3764	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.3766	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3768	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3769	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3770	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3771	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3772	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3773	**500**	Copper alloy scale
New Haven, Yale no. 1938.3774	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3775	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3775a	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3776	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3777	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3778	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3779	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3780	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3781	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3782	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3783	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3784	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3785	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3786	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3787	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3789	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3790	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3791	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3792	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3793	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3794	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3795	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3796	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3797	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3798	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3799	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3800	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3801	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3802	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3803	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3804	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3805	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3806	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3807	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3808	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3809	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3810	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3811	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3812	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3813	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3814	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3815	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3816	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3817	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3818	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3819	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3820	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3821	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3823	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3824	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3825	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3826	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3827	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3828	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3829	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3830	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3831	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3832	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3833	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales

New Haven, Yale no. 1938.3834	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3835	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3836	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3837	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3838	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3839	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3840	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3841	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3842	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3843	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3844	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3845	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3846	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3847	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3848	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3849	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3850	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3851	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3852	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3853	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3854	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3855	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3856	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3857	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3858	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3859	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3860	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3861	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3862	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3863	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3864	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3865	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3866	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3867	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3868	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3869	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3870	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3871	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3872	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3873	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3874	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3875	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3876	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3877	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3878	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3879	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3880	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3881	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3882	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3883	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3884	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3885	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3886	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3887	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3888	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3889	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3890	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3891	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3892	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3893	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3894	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3895	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3896	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3897	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3898	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3899	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3900	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3901	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3902	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3903	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3904	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3905	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3906	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales

New Haven, Yale no. 1938.3907	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3908	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3909	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3910	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3911	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3912	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3913	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3914	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3915	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3916	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3917	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3918	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3919	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3920	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3921	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3922	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3923	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3924	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3925	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3926	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3927	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3930	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3931	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3932	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3933	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3934	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3935	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3936	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3937	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3938	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3939	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3940	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3941	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3942	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3943	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3944	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3945	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3946	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3947	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3948	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3949	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3950	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3951	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3952	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3953	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3954	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3955	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3956	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3957	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3958	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3959	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3960	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3961	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3962	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3963	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3964	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3965	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3966	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3967	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3968	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3969	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3970	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3971	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3972	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3973	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3974	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3975	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3976	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3977	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3978	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3979	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3980	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3981	**493**	Copper alloy scale

New Haven, Yale no. 1938.3982	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3982	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3983	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3984	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3985	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3986	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3987	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3989	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3990	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
New Haven, Yale no. 1938.3991	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3992	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3993	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3994	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.3995	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3996	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3997	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3998	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.3999	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4000	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4001	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4002	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4003	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4004	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4005	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4006	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4007	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4008	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4009	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4010	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4011	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4012	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4013	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4014	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4015	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4016	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4017	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4018	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4019	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4020	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4021	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4022	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4023	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4024	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4025	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4026	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4027	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4028	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4029	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4030	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4031	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4032	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4034	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4035	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4036	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4037	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4038	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4039	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4040	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4041	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4042	**506**	Copper alloy scale
New Haven, Yale no. 1938.4043	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4044	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4045	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4047	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4048	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4049	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4050	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4051	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4052	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4053	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4054	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses

New Haven, Yale no. 1938.4055	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4056	**499 (part of)**	Group of copper alloy scales
New Haven, Yale no. 1938.4057	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4058	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4059	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4060	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4061	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4062	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4063	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4064	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4065	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4067	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4068	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4069	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4070	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4072	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4073	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4074	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4075	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4076	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4077	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4078	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4080	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4082	**494 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4083	**494 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4084	**494 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4085	**494 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4086	**498**	Copper alloy scale
New Haven, Yale no. 1938.4087	**494 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4088	**494 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4089	**494 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4090	**494 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4091	**453**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.4092	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4093	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4094	**501**	Two copper alloy scales
New Haven, Yale no. 1938.4095	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4096	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4097	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4098	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4099	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4100	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4101	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4102	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4103	**502**	Copper alloy scale
New Haven, Yale no. 1938.4104	**468 (part of)**	Double-stapled copper alloy scales
New Haven, Yale no. 1938.4105	**459**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.4106	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4107	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**

New Haven, Yale no. 1938.4108	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4109	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.4110 (part of)	**461**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.4110 (part of)	**419**	Fragments of a copper alloy scale cuirass
New Haven, Yale no. 1938.4111	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
New Haven, Yale no. 1938.4113	**505 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.4114	**510**	Copper alloy scales
New Haven, Yale no. 1938.4115	**454**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.4116	**472**	Double-stapled copper alloy scale
New Haven, Yale no. 1938.4118	**511**	Copper alloy scales
New Haven, Yale no. 1938.4119	**496**	Three copper alloy scales
New Haven, Yale no. 1938.4121	**469**	Double-stapled copper alloy scale
New Haven, Yale no. 1938.4122	**470**	Double-stapled copper alloy scale
New Haven, Yale no. 1938.4123	**471**	Double-stapled copper alloy scale
New Haven, Yale no. 1938.4124	**492**	Two copper alloy scales
New Haven, Yale no. 1938.4125	**508**	Copper alloy plate, probably from scale armour
New Haven, Yale no. 1938.4126	**466**	Copper alloy scale from a lamellar-like garment
New Haven, Yale no. 1938.4127	**490**	Copper alloy scale
New Haven, Yale no. 1938.4131	**457**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.4133	**467**	Copper alloy scale from a lamellar-like garment
New Haven, Yale no. 1938.4134	**432**	Fragments of a copper alloy scale cuirass
New Haven, Yale no. 1938.4135	**440**	Fragments of very fine copper alloy scale armour
New Haven, Yale no. 1938.4136 (part of)	**458**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.4137 (part of)	**435**	Copper alloy scales
New Haven, Yale no. 1938.4137 (part of)	**497**	Copper alloy scale
New Haven, Yale no. 1938.4138	**455**	Fragments of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.4139	**507**	Copper alloy scales
New Haven, Yale no. 1938.4140	**489**	A group of copper alloy scales
New Haven, Yale no. 1938.5215	**50**	Copper alloy buckle
New Haven, Yale no. 1938.5673	**378**	Arming cap of woollen cloth and felt
New Haven, Yale no. 1938.5956	**385**	Fragments of an iron mail shirt
New Haven, Yale no. 1938.5999.49	**769**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.50	**786**	Tanged iron bodkin
New Haven, Yale no. 1938.5999.52	**780**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.53	**803**	Leaf-shaped iron bolt head
New Haven, Yale no. 1938.5999.57	**800**	Leaf-shaped iron bolt head
New Haven, Yale no. 1938.5999.313	**777**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1000	**371**	Complete iron helmet
New Haven, Yale no. 1938.5999.1001	**372**	Iron cheek-piece of a helmet
New Haven, Yale no. 1938.5999.1002	**373**	Fragment of an iron helmet
New Haven, Yale no. 1938.5999.1003	**382**	Fragment of iron mail shirt
New Haven, Yale no. 1938.5999.1004	**387**	Fragment of iron mail
New Haven, Yale no. 1938.5999.1005	**388**	Fragment of iron mail
New Haven, Yale no. 1938.5999.1006	**416**	Fragments of a copper alloy scale cuirass
New Haven, Yale no. 1938.5999.1007	**434**	Fragment of a copper alloy scale cuirass
New Haven, Yale no. 1938.5999.1008	**436**	Copper alloy scales
New Haven, Yale no. 1938.5999.1009	**441**	Leather 'lamellar' cuisse
New Haven, Yale no. 1938.5999.1010	**462**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.5999.1011	**463**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.5999.1012	**464**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.5999.1013	**465**	Fragment of lamellar-like copper alloy scale garment
New Haven, Yale no. 1938.5999.1014	**473**	Double-stapled copper alloy scale
New Haven, Yale no. 1938.5999.1015	**474**	Row of iron scales
New Haven, Yale no. 1938.5999.1016	**479**	A row of large iron scales
New Haven, Yale no. 1938.5999.1017	**480**	A row of large iron scales
New Haven, Yale no. 1938.5999.1018	**485**	Iron scales
New Haven, Yale no. 1938.5999.1019	**486**	A row of iron scales
New Haven, Yale no. 1938.5999.1020	**487**	A pair of iron scales
New Haven, Yale no. 1938.5999.1021	**488**	A pair of iron scales
New Haven, Yale no. 1938.5999.1022	**495**	Copper alloy scale
New Haven, Yale no. 1938.5999.1023	**504 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.5999.1024	**504 (part of)**	Copper alloy scales
New Haven, Yale no. 1938.5999.1025	**515**	Fragment of sword blade
New Haven, Yale no. 1938.5999.1026	**516**	Sword tang
New Haven, Yale no. 1938.5999.1027	**521**	Fragment of a sword blade
New Haven, Yale no. 1938.5999.1028	**522**	Fragment of a dagger
New Haven, Yale no. 1938.5999.1029	**542**	Copper alloy slide
New Haven, Yale no. 1938.5999.1030	**298**	Copper alloy harness mount
New Haven, Yale no. 1938.5999.1031	**235**	Copper alloy rhomboidal pendant
New Haven, Yale no. 1938.5999.1033	**804**	Iron head from an incendiary bolt
New Haven, Yale no. 1938.5999.1034	**704**	Three-bladed iron arrowhead
New Haven, Yale no. 1938.5999.1035	**791**	Tanged iron bodkin
New Haven, Yale no. 1938.5999.1036	**787**	Tanged iron bodkin

New Haven, Yale no. 1938.5999.1037	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.5999.1038	**771**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1039	**755**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1040	**757**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1041	**781**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1042	**756**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1043	**742**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1044	**761**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1045	**760**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1046	**765**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1047	**779**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1048	**743**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1049	**749**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1050	**750**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1051	**767**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1052	**766**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1053	**747**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1054	**764**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1055	**778**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1056	**774**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1057	**775**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1058	**773**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1059	**790**	Tanged iron bodkin
New Haven, Yale no. 1938.5999.1060	**783**	Tanged iron bodkin
New Haven, Yale no. 1938.5999.1061	**792**	Tanged iron bodkin
New Haven, Yale no. 1938.5999.1062	**811**	Almost complete wooden bolt shaft, originally with three vanes
New Haven, Yale no. 1938.5999.1063	**827**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1938.5999.1064	**723**	Broken shaft of reed and wood
New Haven, Yale no. 1938.5999.1065	**721**	Broken shaft of reed and wood
New Haven, Yale no. 1938.5999.1066	**722**	Broken shaft of reed and wood
New Haven, Yale no. 1938.5999.1067	**694**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1068	**728**	Wooden arrow footing
New Haven, Yale no. 1938.5999.1069	**737**	Reed shaftment
New Haven, Yale no. 1938.5999.1070	**736**	Reed shaftment
New Haven, Yale no. 1938.5999.1071	**720**	Broken shaft of reed and wood
New Haven, Yale no. 1938.5999.1072	**729**	Wooden arrow footing
New Haven, Yale no. 1938.5999.1073	**607**	Fragment of iron boss
New Haven, Yale no. 1938.5999.1074	**606**	Fragment of a star-shaped copper alloy boss
New Haven, Yale no. 1938.5999.1075	**598**	Fragment of circular iron boss
New Haven, Yale no. 1938.5999.1076	**610**	Iron shield reinforcing bar/grip
New Haven, Yale no. 1938.5999.1078	**613**	Fragment of iron reinforcing bar/grip
New Haven, Yale no. 1938.5999.1079	**612**	Fragment of iron reinforcing bar/grip
New Haven, Yale no. 1938.5999.1080	**615**	Fragment of iron reinforcing bar/grip
New Haven, Yale no. 1938.5999.1081	**614**	Fragment of iron reinforcing bar/grip
New Haven, Yale no. 1938.5999.1082	**640**	Iron spearhead socket
New Haven, Yale no. 1938.5999.1083	**642**	Iron spear/javelin-head socket
New Haven, Yale no. 1938.5999.1084	**639**	Broken iron spearhead
New Haven, Yale no. 1938.5999.1085	**641**	Iron spear/javelin-head socket
New Haven, Yale no. 1938.5999.1086	**569**	Iron chape
New Haven, Yale no. 1938.5999.1087	**684**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1088	**701**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1089	**683**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1090	**700**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1091	**686**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1092	**681**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1093	**689**	A pair of three-bladed tanged iron arrowheads.
New Haven, Yale no. 1938.5999.1094	**687**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1095	**690**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1096	**699**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1097	**678**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1098	**702**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1099	**698**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1100	**706**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1101	**692**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1102	**688**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1103	**708**	Three-bladed double-barbed and tanged iron arrowhead
New Haven, Yale no. 1938.5999.1104	**707**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1105a–c	**627**	Fragments of an oval wooden plank shield
New Haven, Yale no. 1938.5999.1106	**628**	Fragment of an oval wooden plank shield
New Haven, Yale no. 1938.5999.1107	**619**	Oval wooden plank shield (shield IV)
New Haven, Yale no. 1938.5999.1108a–e	**626**	Fragments of an oval wooden plank shield

New Haven, Yale no. 1938.5999.1109	**631**	Fragments of a plywood semicylindrical shield
New Haven, Yale no. 1938.5999.1110	**625**	Large fragment of an oval wooden plank shield
New Haven, Yale no. 1938.5999.1111	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.5999.1112	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
New Haven, Yale no. 1938.5999.1113	**847**	Carved artillery stone
New Haven, Yale no. 1938.5999.1114	**848**	Carved artillery stone
New Haven, Yale no. 1938.5999.1115	**849**	Carved artillery stone
New Haven, Yale no. 1938.5999.1116	**846**	Possible artillery stone
New Haven, Yale no. 1938.5999.1117	**851**	Carved artillery stone
New Haven, Yale no. 1938.5999.1118	**819**	Broken wooden bolt shaft with two vanes
New Haven, Yale no. 1938.5999.1119	**745**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.1120	**518**	Fragment of sword blade
New Haven, Yale no. 1938.5999.1121	**531**	Rock crystal sword pommel
New Haven, Yale no. 1938.5999.1122	**570**	Iron chape
New Haven, Yale no. 1938.5999.1123	**605**	Fragment of a star-shaped copper alloy boss
New Haven, Yale no. 1938.5999.1124	**643**	Iron falx muralis (?)
New Haven, Yale no. 1938.5999.1125	**676**	Triangular two-bladed collared and tanged iron arrowhead
New Haven, Yale no. 1938.5999.1126	**682**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1127	**697**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1128	**705**	Three-bladed tanged iron arrowhead
New Haven, Yale no. 1938.5999.1130	**795**	Leaf-shaped iron bolt head
New Haven, Yale no. 1938.5999.1131	**796**	Leaf-shaped iron bolt head
New Haven, Yale no. 1938.5999.1132	**797**	Leaf-shaped iron bolt head
New Haven, Yale no. 1938.5999.1133	**798**	Leaf-shaped iron bolt head
New Haven, Yale no. 1938.5999.1134	**801**	Leaf-shaped iron bolt head
New Haven, Yale no. 1938.5999.1135	**802**	Leaf-shaped iron bolt head
New Haven, Yale no. 1938.5999.1137	**810**	Complete wooden bolt shaft, originally with three vanes
New Haven, Yale no. 1938.5999.1138	**384**	Fragments of an iron mail shirt
New Haven, Yale no. 1938.5999.1139	**389**	Fragment of iron mail
New Haven, Yale no. 1938.5999.1140	**392**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.5999.1141	**411**	Copper alloy edging from iron mail
New Haven, Yale no. 1938.5999.1142	**439**	Fragment of a very fine copper alloy scale shirt
New Haven, Yale no. 1938.5999.1143	**442**	Leather 'lamellar' cuisse
New Haven, Yale no. 1938.5999.1144	**445**	Possible cuisse of iron scales
New Haven, Yale no. 1938.5999.1145	**446**	Fragment of cuisse of iron laminated armour
New Haven, Yale no. 1938.5999.1147	**475**	Large iron scale
New Haven, Yale no. 1938.5999.1148	**477**	A row of large iron scales
New Haven, Yale no. 1938.5999.1149	**478**	A row of large iron scales
New Haven, Yale no. 1938.5999.1150	**481**	A large iron scale
New Haven, Yale no. 1938.5999.1151	**483**	A row of large iron scales
New Haven, Yale no. 1938.5999.1157	**71**	Iron buckle (from Halebiyeh)
New Haven, Yale no. 1938.5999.1161	**138**	Copper alloy strap terminal
New Haven, Yale no. 1938.5999.1163	**198**	Copper alloy lunate pendant (?)
New Haven, Yale no. 1938.5999.1171	**284**	Copper alloy domed stud
New Haven, Yale no. 1938.5999.1176	**366**	Fragment of copper alloy 'saddle plate'
New Haven, Yale no. 1938.5999.1177	**370**	Iron caltrop
New Haven, Yale no. 1938.5999.1228	**513**	Complete longsword blade
New Haven, Yale no. 1938.5999.1977	**611**	Fragment of iron reinforcing bar/grip
New Haven, Yale no. 1938.5999.2851	**763**	Socketed iron bodkin
New Haven, Yale no. 1938.5999.2852	**499 (part of)**	Group of copper alloy scales
New Haven, Yale no. 1938.5999.2853	**499 (part of)**	Group of copper alloy scales
New Haven, Yale no. 1938.5999.4656	**599**	Circular iron boss
New Haven, Yale no. 1938.5999.4657	**601**	Fragmentary circular iron boss
New Haven, Yale no. 1938.5999.4658	**602**	Fragment of circular iron boss
New Haven, Yale no. 1938.5999.4659	**600**	Fragment of circular (?) iron boss
Paris, Louvre no. AO 28429	**833**	Broken wooden bolt shaft with two vanes
Paris, Louvre no. AO 28430	**832**	Complete wooden bolt shaft
Toronto, Royal Ontario Museum no. 933.25.10	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
Toronto, Royal Ontario Museum no. 933.25.11	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
Toronto, Royal Ontario Museum no. 933.25.12	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
Toronto, Royal Ontario Museum no. 933.25.13	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
Toronto, Royal Ontario Museum no. 933.25.14	**449 (part of)**	Copper alloy scales from 'accessories' to horse armour **449**
Toronto, Royal Ontario Museum no. 933.25.15	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
Toronto, Royal Ontario Museum no. 933.25.16	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
Toronto, Royal Ontario Museum no. 933.25.17	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
Toronto, Royal Ontario Museum no. 933.25.18	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
Toronto, Royal Ontario Museum no. 933.25.19	**451 (part of)**	Fragments of an armoured trapper of copper alloy scales
Toronto, Royal Ontario Museum no. 933.25.22	**393**	Fragment of iron mail
Toronto, Royal Ontario Museum no. 933.25.23	**394**	Fragment of iron mail
Toronto, Royal Ontario Museum no. 933.25.24	**395**	Fragment of iron mail

Toronto, Royal Ontario Museum no. 933.25.25	**396**	Fragment of iron mail
Toronto, Royal Ontario Museum no. 933.25.26	**397**	Fragment of iron mail
Toronto, Royal Ontario Museum no. 933.25.27 (part of), formerly New Haven, Yale no. 1931.590i	**830**	Wooden bolt shaft
Toronto, Royal Ontario Museum no. 933.25.27 (part of), formerly New Haven, Yale no. 1931.590i	**782**	Socketed iron bodkin
Toronto, Royal Ontario Museum no. 933.25.28	**793**	Tanged iron bodkin
Toronto, Royal Ontario Museum no. 933.25.30	**794**	Tanged iron bodkin
Toronto, Royal Ontario Museum no. 936.58.1	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
Toronto, Royal Ontario Museum no. 936.58.2	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
Toronto, Royal Ontario Museum no. 936.58.3	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
Toronto, Royal Ontario Museum no. 936.58.4	**443 and 444 (part of)**	Fragmentary copper alloy scale armour, probably a pair of cuisses
Unlocated items		
Location unknown	**11**	Copper alloy (?) shield-shaped baldric fastener
Location unknown	**30**	Copper alloy baldric plate (?)
Location unknown	**42**	Copper alloy ring buckle
Location unknown	**52**	Copper alloy buckle loop
Location unknown	**63**	Copper alloy buckle loop
Location unknown	**92**	Copper alloy belt plate
Location unknown	**108**	Pierced copper alloy plate
Location unknown	**136**	Hinged copper alloy strap terminal
Location unknown	**158**	Silver (?) strap terminal
Location unknown	**210**	Copper alloy leaf-shaped pendant with ring (?) attachment
Location unknown	**229**	Copper alloy leaf-shaped pendant
Location unknown	**242**	Copper alloy stud
Location unknown	**253**	Bone stud
Location unknown	**255**	Copper alloy stud
Location unknown	**256**	Copper alloy stud
Location unknown	**257**	Copper alloy stud
Location unknown	**300**	Copper alloy 'S'-shaped strap mount (?)
Location unknown	**301**	Copper alloy strap mount (?)
Location unknown	**317**	Copper alloy disc
Location unknown	**362**	Fragment of copper alloy 'saddle plate'
Location unknown	**412**	Fragment of iron mail
Location unknown	**413**	Fragment of iron mail
Location unknown	**414**	Copper alloy, probable hook fastener from a mail shirt
Location unknown	**559**	Copper alloy (?) chape
Location unknown	**562**	Copper alloy chape
Location unknown	**563**	Copper alloy chape
Location unknown	**574**	Bone chape
Location unknown	**576**	Copper alloy chape
Location unknown	**609**	Iron boss
Location unknown	**620**	Oval wooden plank shield (shield V)
Location unknown	**621**	Fragment of oval wooden plank shield (Cumont fragment A; not illustrated)
Location unknown	**622**	Fragment of an oval wooden plank shield (Cumont fragment C; not illustrated)
Location unknown	**623**	Fragments of an oval wooden plank shield (Cumont fragment D; not illustrated)
Location unknown	**630**	Leather facing and wood from a semicylindrical shield (Cumont fragment B; not illustrated)
Location unknown	**632**	Fragment of a plywood shield
Location unknown	**633**	Oval plywood shield with no boss
Location unknown	**634**	Oval shield-board or covering with no boss
Location unknown	**646**	Possible wooden spearshaft
Location unknown	**709**	Pair of three-bladed tanged iron arrowheads
Location unknown	**710**	Three-bladed tanged iron arrowhead
Location unknown	**711**	Three-bladed tanged iron arrowhead
Location unknown	**712**	Three-bladed tanged iron arrowhead
Location unknown	**714**	Three-bladed tanged iron arrowhead
Location unknown	**715**	Three-bladed tanged iron arrowhead
Location unknown	**716**	Three-bladed tanged iron arrowhead
Location unknown	**717**	Three-bladed tanged iron arrowhead
Location unknown	**718**	Three-bladed tanged iron arrowhead
Location unknown	**719**	Three-bladed tanged iron arrowhead
Location unknown	**739**	Reed shaftment with intact fletching
Location unknown	**740**	Reed shaft with wooden footing
Location unknown	**741**	Wooden arrow footing

Index of materials of manufacture and embellishment

Many items were of course made from several materials. Most of the following materials were identified by eye, and should be regarded as provisional, e.g. the distinctions between bone and ivory items, and between 'rawhide', 'skin', and 'leather'.

Index of references to catalogued items

General index